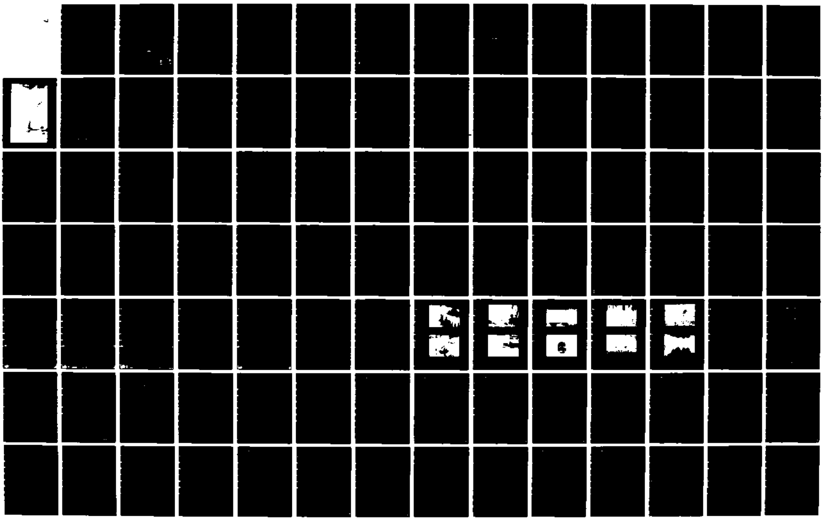
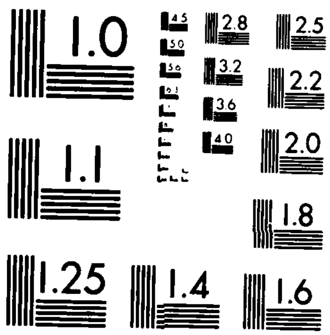
AD-A142 709 CONNECTICUT COASTAL BASIN DARIEN - NORWALK CONNECTICUT 1/2
CHASMARS POND DAM (.. (U) CORPS OF ENGINEERS WALTHAM MA
NEW ENGLAND DIV MAY 81

UNCLASSIFIED F/G 13/13 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AD-A142 709

CONNECTICUT COASTAL BASIN

DARIEN - NORWALK, CONNECTICUT

CHASMARS POND DAM
CT 00059

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

MAY 1981

84 07 03 048

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00059	2. GOVT ACCESSION NO. A142709	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Conn. Coastal Basin Darien - Norwalk, Conn., Chasmars Pond Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE May 1981
		13. NUMBER OF PAGES 75
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Conn. Coastal Basin
Darien - Norwalk, Conn
Chasmars Pond Dam

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Chasmars Pond Dam, completed in 1900, is a 92 ft. long, 11 ft. high masonry overflow structure. The dam impounds the Fivemile River on the Norwalk-Darien,Conn. border approx. 35 ft. upstream from a 25.8 ft. high and 18.6 ft. wide horseshoe-shaped masonry railroad culvert. Flow over the structure is channeled to the culvert by tow masonry wing walls that extend from the culvert to the abutments of the dam. The 77 ft. long spillway crest is 1.5 ft. below the top of the dam abutments and is the only discharge facility in service at the site. The dam was originally used to create a water supply, adjacent to the railroad tracks, for the early steam locomotives.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

CHASMARS POND DAM

CT 00059

CONNECTICUT COASTAL BASIN

NORWALK — DARIEN, CONNECTICUT

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION. CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

NEDED

JUN 30 1981

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Chasmars Pond Dam (CT-00059) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is vitally important part.

Copies of this report have been forwarded to the Department of Environmental Protection, and to the owner, Nathaniel C. Groby, c/o Newman & Newman Attorneys, Rowayton, CT and Wing Walls and Culvert, c/o Mr. R. G. Klopfer, New York, NY. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Protection for your cooperation in this program.

Sincerely,

C. E. Edgar III

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

Incl
As stated

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification No.: CT 00059

Name of Dam: Chasmars Pond Dam

Town: Norwalk - Darien

County and State: Fairfield, Connecticut

Stream: Fivemile River

Date of Inspection: December 10, 1980

BRIEF ASSESSMENT

The Chasmars Pond Dam, completed in 1900, is a 92-foot-long, 11-foot-high masonry overflow structure. The dam impounds the Fivemile River on the Norwalk-Darien, Connecticut, border approximately 35 feet upstream from a 25.8-foot-high and 18.6-foot-wide horseshoe-shaped masonry railroad culvert. Flow over the structure is channeled to the culvert by two masonry wing walls that extend from the culvert to the abutments of the dam. The 77-foot-long spillway crest is 1.5 feet below the top of the dam abutments and is the only discharge facility in service at the site. The dam was originally used to create a water supply, adjacent to the railroad tracks, for the early steam locomotives. Currently, the impoundment is used for recreational purposes. Although the dam, wing walls, and large culvert must be studied hydrologically and hydraulically as an integral unit, they are owned separately. The dam and a large portion of the pond are owned by Nathaniel C. Groby, while the railroad culvert and wing walls are maintained by Consolidated Rail Corporation (Conrail).

Based on the visual inspection and past performance, the dam is judged to be in fair condition. No evidence of instability or bulging were observed, but there were signs of seepage at the base of the dam and wing wall near the right abutment. Much of the mortar between the stone blocks on the exposed downstream face was missing; however, these joints did not appear to be the source of any seepage.

In accordance with the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the top of dam storage capacity (56 ac-ft) and the height of the dam (11 feet), the project is considered to be SMALL in size. In addition, the dam has been assigned a HIGH hazard classification as a result of the potential for the loss of more than a few lives due to a breach of the dam. Consequently, the test flood will be equivalent to one-half the Probable Maximum Flood (1/2 PMF). The resulting inflow to the pond is 915 cubic feet per second per square mile (cfs/sq. mi.) or 5,100 cubic feet per second (cfs). The test flood outflow is approximately 5,040 cfs; and the capacity of the spillway, with the water surface at the top of the dam, is 470 cfs or 9 percent of the routed test flood outflow. At discharges in excess of 1,600 cfs control passes from the dam to the railroad culvert. As a result, during the test flood the spillway dam becomes a submerged weir due to the headwater effects created by the culvert and the dam will be overtopped by approximately 10.5 feet.

It is recommended that the owner retain a qualified registered professional engineer to determine the origin and severity of the seepage through the dam, assess the need for the means to provide a low-level regulating outlet, and evaluate the influence of the upstream constrictions on the peak flood inflows at the dam and assess the structure's ability to withstand overtopping. The recommendations and remedial measures discussed in Section 7 should be instituted within one (1) year of the owner's receipt of this report.

R. A. Hokenson, P.E.

R. A. Hokenson, P.E.
Project Manager
International Engineering Company, Inc.

COMMONWEALTH OF MASSACHUSETTS
REYNOLD
A.
HOKENSON
No. 23125
REGISTERED
PROFESSIONAL ENGINEER

This Phase I Inspection Report on Chasmars Pond Dam (CT-00059) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the <u>Recommended Guidelines for Safety Inspection of Dams</u>, and with good engineering judgement and practice, and is hereby submitted for approval.

JWFinegan

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

Aramast Mahtesian

ARAMAST MAHTESIAN, MEMBER
Geotechmical Engineering Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

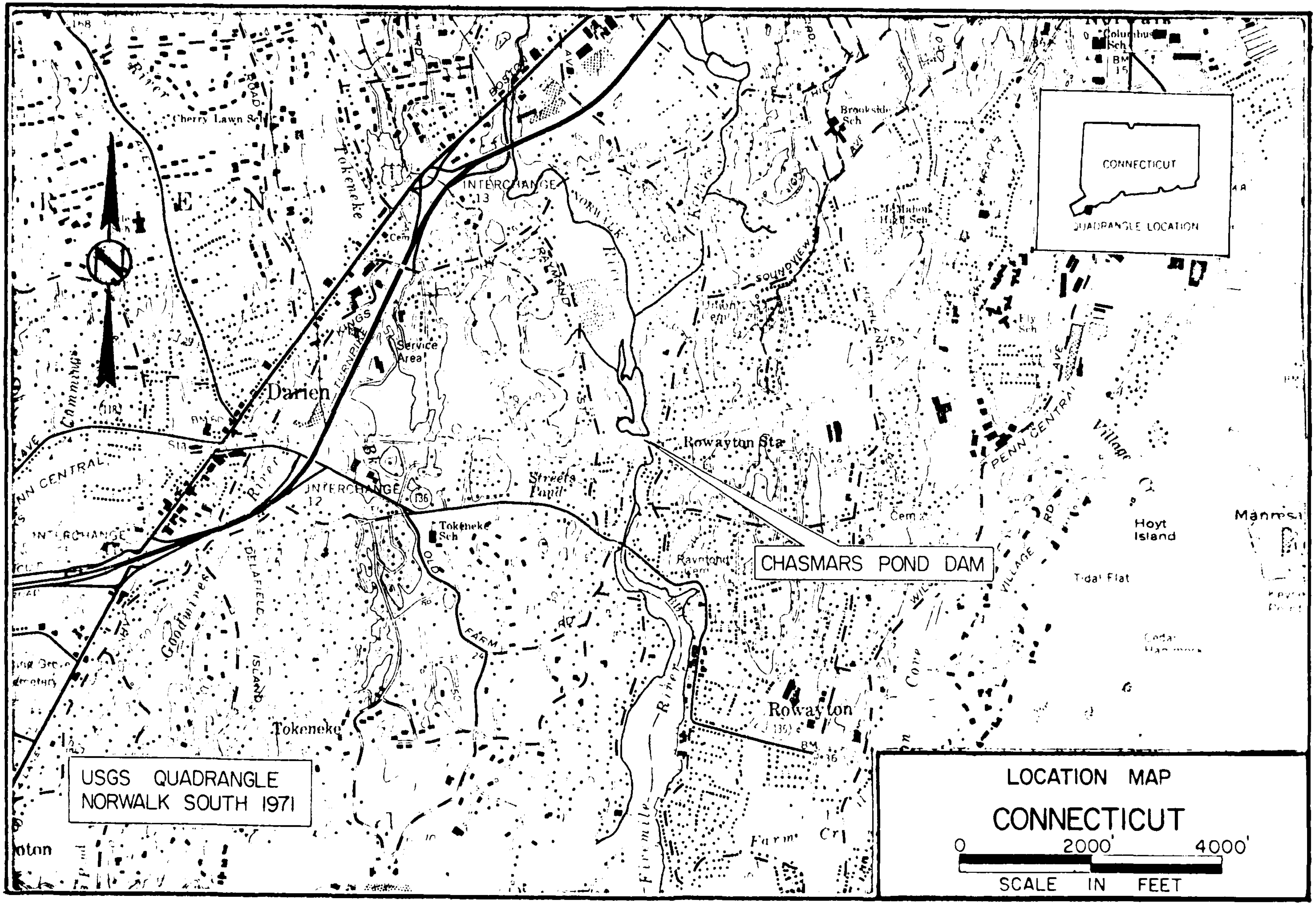
Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm

event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

TABLE OF CONTENTS

OVERVIEW PHOTO-CHASMARS POND DAM
FEBRUARY 15, 1981


LOCATION MAP
CONNECTICUT
0 2000' 4000'
SCALE IN FEET
USGS QUADRANGLE
NORWALK SOUTH 1971
CHASMARS POND DAM
CONNECTICUT
QUADRANGLE LOCATION
Darien
Rowayton Sta
Rowayton
Tokeneke
Hoyt Island
Tidal Flat
INTERCHANGE 13
INTERCHANGE 12
PENN CENTRAL
Service Area
Brookside Sch
Tokeneke Sch
Cherry Lawn Sch
SOUNDVIEW
DELAFIELD
ISLAND
RAYMOND

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

CHASMARS POND DAM

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority — Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England region. International Engineering Company, Inc., has been retained by the Corps' New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to International Engineering Company in a letter dated November 5, 1980, from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0015 has been designated by the Corps for this work.

b. Purpose of Inspection Program — The purposes of the program are to:

(1) Perform technical inspections and evaluations of non-Federal dams to identify conditions requiring correction in a timely manner by non-Federal interests.

(2) Encourage and prepare the States to quickly initiate effective dam inspection programs for non-Federal dams.

(3) Update, verify, and complete the National Inventory of Dams.

c. Scope of Inspection Program — The scope of this Phase I Inspection Report includes:

(1) Gathering, reviewing, and presenting all available data as can be obtained from the owners, previous owners, the state, and other associated parties.

(2) A field inspection of the facility detailing the visual condition of the dam, embankments, and appurtenant structures.

(3) Computations concerning the hydraulics and hydrology of the facility and its relationship to the calculated flood through the existing spillway.

(4) An assessment of the condition of the facility and corrective measures required.

It should be noted that this report does not pass judgement on the safety or stability of the dam other than on a visual basis. The purpose of the inspection is to identify those features of the dam which need corrective action and/or further study.

1.2 DESCRIPTION OF PROJECT

a. Location — The dam is located on the Fivemile River in a residential area on the border of Norwalk and Darien, Fairfield County, Connecticut. The Chasmars Pond Dam is the last dam within the Fivemile River before the Long Island Sound estuary. The location of the dam is defined by the coordinates latitude N41°04.7' and longitude W73°26.9' on the South Norwalk, Connecticut, USGS Quadrangle Map.

b. Description of the Dam and Appurtenances — The spillway dam is a 92-foot-long, 11-foot-high, masonry structure that is arched in plan. Two masonry wing walls extend from the dam abutments (El. 26.1 NGVD) to a large railroad culvert located approximately 35 feet downstream forming a

transition channel between the dam and the culvert. (Note: All elevations are referenced to National Geodetic Vertical Datum.) The 100-foot-long horseshoe-shaped culvert is an 18.6-foot-high and 25.8-foot-wide brick-lined, masonry structure, which passes under a railroad embankment. The top of the embankment (El. 51) is 26.4 feet above the crest of the spillway dam. A second, smaller, masonry culvert under the railroad embankment is located about 100 feet from the left dam abutment. This culvert is a 4.7-foot-high and 9.5-foot-wide structure with an invert elevation approximately equal to the elevation of the top of the dam abutments. An approach channel, adjacent to the left bank of the pond leads to the smaller culvert.

The 77-foot-long, 9.5-foot-high masonry spillway section has a 3-foot-wide crest, a vertical downstream face, and a sloping upstream face. The spillway crest elevation is 24.6, or 1.5 feet below the top of the abutments. A 2-foot by 2-foot opening located 7 feet from the right wing wall, at the base of the dam, appears to have been a drain or low-level outlet; however, the exact nature of this opening is unknown.

c. Size Classification - SMALL — The size classification is based on the height of the dam above the natural streambed or the maximum storage potential, which is considered to be the storage resulting from the water surface elevation within the impoundment being equal to the elevation of the dam. The size of the dam is then determined by either storage or height depending on which criteria yields the larger size category. Chasmars Pond has a maximum potential storage capacity of 56 ac-ft, which is within the established limits for the small size category (50 ac-ft to 1,000 ac-ft), while the height of the dam (11 feet) is below the limits for the small size category (25 feet to 50 feet). Consequently, the dam is considered to be SMALL in size.

d. Hazard Classification - HIGH — The hazard classification is based on the estimated loss of life and the anticipated property damage due to a dam breach when the water surface within the impoundment is at

the top of the dam. The failure of Chasmars Pond Dam would cause the water level within the impact area to rise from 3.3 feet at a prefailure outflow of 470 cfs to 6.4 feet after the failure. Prior to the dam failure the first floor of 6 homes would be inundated to a depth of one foot and the three homes behind the dike would experience less than a foot of flooding at the first floor elevation. Following the dam failure the water surface would rise 4 feet above the first floor elevation of 7 homes and 2 feet in five other homes within the flood plane. In total the dam failure would damage 12 homes, the bridges at Carolyn Court, Jacob Street and Cudlipp Avenue and could potentially cause the loss of more than a few lives (see Appendix D, Sheet D-12). Therefore, the dam has been classified as having a HIGH hazard potential.

e. Ownership — Dam: Nathaniel C. Groby
c/o Newman and Newman Attorneys
P.O. Box 385
Rowayton, Connecticut 06853
(203) 853-4700

Ownership — Wing Walls and Culvert:
Consolidated Rail Corporation (Conrail)
347 Madison Avenue
New York, N.Y. 10017
Attn: Mr. R. G. Klopfer
(212) 340-2218

f. Operator — None.

g. Purpose of Dam — Recreation.

h. Design and Construction History — No records were available pertaining to the design or construction of the spillway dam.

i. Normal Operational Procedures — The water level in the pond is maintained at the crest of the spillway (El. 24.6). Currently, discharge from the pond is conducted exclusively over the spillway dam.

1.3 PERTINENT DATA

a. Drainage Area — The drainage area consists of approximately 12.2 square miles (sq. mi.) of developed terrain. Within the drainage area, there are numerous constrictions in the Fivemile River that will detain runoff during the test flood storm. Therefore, it was assumed that the runoff from that portion of the drainage area north of Merritt Parkway would be sufficiently retained to mitigate the effects of the storm and, thus, reduce the peak inflow to Chasmars Pond. As a result, the runoff from the remaining 5.58 sq. mi. of the drainage area, south of the Merritt Parkway, would contribute the major peak of the inflow hydrograph.

b. Discharge at Damsite — The Chasmars Pond Dam spillway is the only discharge facility at the site.

(1) Outlet Works — None.

(2) The maximum known flood to date was reported by USGS as 2,140 cfs (366 csm). This flow was recorded approximately 3 miles north of Chasmars Pond Dam in the Fivemile River at New Canaan, Connecticut, (Drainage Area = 5.85 sq. mi.) in October 1955.

(3) Ungated spillway capacity at top of dam (El. 26.1) is 470 cfs.

(4) Ungated spillway capacity at test flood elevation 36.6 is 3,070 cfs. (Discharging as a submerged weir, the dam is overtopped by 10.5 feet.)

(5) Gated spillway capacity at normal pool elevation — N/A.

(6) Gated spillway capacity at test flood elevation — N/A.

(7) Total spillway capacity at test flood elevation (36.6) is 3,070 cfs. (Discharging as a submerged weir, the dam is overtopped by 10.5 feet.)

(8) Total project discharge at top of dam (El. 26.1) is 470 cfs.

(9) Total project discharge at test flood elevation 36.6 is 5,040 cfs.

c. Elevations (feet above NGVD)

(1)	Streambed at toe of dam	15.1
(2)	Bottom of cutoff	Unknown
(3)	Maximum tailwater	Unknown
(4)	Normal pool (recreation)	24.6
(5)	Flood-control pool	N/A
(6)	Spillway crest	24.6
(7)	Design surcharge (original design)	Unknown
(8)	Top of dam abutments	26.1
(9)	Test flood surcharge	36.6

d. Reservoir (length in feet)

(1)	Normal pool (recreation)	1,700
(2)	Flood-control pool	N/A
(3)	Spillway crest pool	1,700
(4)	Top of dam abutments	1,900

(5) Test flood pool 4,400

e. <u>Storage</u> (acre-feet)

(1) Normal pool	26
(2) Flood-control pool	N/A
(3) Spillway crest pool	26
(4) Top of dam abutments	56
(5) Test flood pool	710

f. <u>Reservoir Surface</u> (acres)

(1) Normal pool	26.5
(2) Flood-control pool	N/A
(3) Spillway crest	26.5
(4) Top of dam abutments	28.5
(5) Test flood pool	88.0

g. <u>Dam</u> Arched masonry overflow structure

(1) Length	92
(2) Height	11
(3) Top Width	3

(4)	Side Slopes	Upstream: Unknown; Downstream: Vertical
(5)	Zoning	Unknown
(6)	Impervious Core	Unknown
(7)	Cutoff	Unknown
(8)	Grout Curtain	Unknown
(9)	Other	None

h. Diversion and Regulatory Tunnel N/A

i. Spillway

(1)	Type	Broad-crested masonry weir
(2)	Length of weir	77 ft
(3)	Crest elevation	24.6
(4)	Gates	N/A
(5)	U/S Channel	Chasmars Pond
(6)	D/S Channel	Transition channel to RR embankment
(7)	General	None

j. Regulatory Outlets None

SECTION 2: ENGINEERING DATA

2.1 DESIGN DATA

No original design data were available for the spillway dam. However, the computations performed by Seelye, Stevenson, Value, and Knecht, 101 Park Avenue, New York, New York, in a flood control study of the Fivemile River (October 1958) were available. The flood control study was performed for the City of Norwalk to evaluate the impact of a major flood in the Fivemile River watershed and to develop corrective measures for the mitigation of the flood's impact. The calculations include hydrologic and hydraulic evaluations of the existing riverbed and the structures in or along the river.

2.2 CONSTRUCTION DATA

Construction data were not available for the Chasmars Pond Dam.

2.3 OPERATION DATA

No written operation and maintenance manual is available for this dam. The structure is currently used as an overflow weir to maintain a recreation pool at the site.

2.4 EVALUATION OF DATA

a. Availability — Data were provided by the City of Norwalk Engineering Department and the State of Connecticut Water Resources Department.

b. Adequacy — The data contained in the Fivemile River study, supplemented by local topography provided by the City of Norwalk and field measurements made by International Engineering Company engineers was sufficient to perform the hydrologic/hydraulic computations outlined by the Corps. No engineering data were available to perform an in-depth

stability analysis of the spillway dam. The final assessment of the structure, therefore, was based primarily on the visual inspection, performance history, and spillway capacity computations.

c. Validity — The field inspection indicated that the external features of the Chasmars Pond Dam coincide with those shown in the flood control study performed by Seelye, Stevenson, Value, and Knecht in October 1958.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General — The field inspection of Chasmars Pond Dam was conducted on December 10, 1980. At the time of the inspection, the water surface elevation was approximately 24.7; and as a result, there was flow over the spillway dam.

b. Dam — The dam is a masonry overflow structure. Flow over the structure hindered the inspection, in that the downstream face of the spillway dam could not be closely examined. However, the stone blocks on the crest and on the downstream face appeared to have maintained their original alignment (Photos 1 and 2). Despite the deterioration of the mortar joints on the downstream face of the spillway dam, there was only one stone block missing at the crest of the spillway near the left abutment.

Seepage was evident at the base of the dam near the right abutment and at the interface of the dam and the right wing wall. It was estimated that the total seepage flow from these areas was approximately 2 to 4 gallons per minute (gpm). An opening was also noted at the base of the spillway dam near the right abutment (Photo 3). This 2-foot by 2-foot opening appeared to have been designed into the structure as a low-level outlet or pool drain rather than being the result of deterioration. Seepage through this opening was estimated to be 10 to 15 gpm and appeared to be clear; however, an accumulation of fine tan material in and around the opening suggests that the discharge contains suspended particles. Due to the flow over the dam and the location of the opening a close examination of these deposits was impossible. However, the material appeared to be either a silt or clay. No upstream intake control for this outlet was noted.

The masonry wing walls (Photos 1 and 2) form a transition channel between the dam and the railroad culvert. No signs of bulging or settlement of the walls were noted; however, a small, immeasurable amount of seepage was observed emanating from the mortar joints. In addition, several trees ranging from 2 to 8 inches in diameter and patches of brush were noted overhanging the transition channel.

There was a slight accumulation of debris on the spillway dam and in the transition channel (Photos 1, 2 and 3). In addition, several trees overhanging the transition channel were noted near the wing walls and above the large masonry culvert.

c. Appurtenant Structures — There are no other existing structures associated with the operation of the spillway dam. The foundation of what was reportedly a tank structure that was used to supply water to the early steam locomotives was found approximately 50 feet from the right wing wall (Photo 4).

A small masonry culvert within the railroad embankment located about 100 feet from the left abutment of the spillway dam was, at one time, employed to discharge water from the site. It was reported that a dam located near the entrance of the narrow channel leading to the small culvert impounded Fivemile River before the existing Chasmars Pond Dam was constructed. Flow from the river was diverted through the small culvert to a carriage factory where it was used to operate hydromechanical equipment. The upstream opening of this culvert was almost completely filled (Photo 3), but it was estimated that the invert elevation of the upstream end of the culvert is the same as the top of the dam abutments (El. 26.1). The approach channel to this culvert has been overgrown by trees and brush (Photo 7). In addition, a 60-foot-long section of the approach channel, adjacent to the culvert entrance, has been filled in, thus making drainage through this outlet impossible (Photo 7). The downstream outlet of this culvert was unobstructed and in relatively good condition (Photo 9).

d. Reservoir Area — The area surrounding the pond is largely residential. The impoundment is, however, bordered by both wooded and marshy terrain (Photos 1 and 2).

e. Downstream Channel — The downstream channel follows the natural path of the Fivemile River. Flow over the spillway dam is channeled by the wing walls through a 18.6-foot-high and 25.8-foot-wide railroad culvert approximately 35 feet downstream of the spillway dam. A small accumulation of debris (logs, rocks and twigs) was noted in the transition channel, while the 100-foot-long reach within the railroad culvert appeared to be clear of obstructions (Photo 5 and 6). The right bank of the river immediately downstream from the culvert is formed by a crude rock and earthfill dike, which was apparently constructed for land reclamation.

Currently, there are 3 houses located behind this 200-foot-long dike (Photo 6). The remaining 1,500-foot-long reach of the river flows through a heavily developed residential area before passing under the Carolyn Court, Jacob Street, and Cudlipp Avenue bridges and terminating in Long Island Sound. Within this reach there are several homes with first floor elevations less than 3 feet above the streambed (Photo 10).

3.2 EVALUATION

Based on the visual inspection of Chasmars Pond Dam, it has been determined that the structure is in generally fair condition. The following features, which could influence the condition and/or stability of the dam in the future, were identified:

(1) Seepage through the structure could leach the remaining mortar joints, thus reducing the dam's ability to resist lateral and uplift pressures.

(2) Seepage under the dam in the vicinity of the right abutment accompanied by the passage of fine material could be an indication of the erosion of the dam foundation. This could eventually result in the undermining of the dam.

(3) The absence of an operable low-level outlet to draw down the pool prohibits the repair of the upstream face of the dam.

(4) The displaced mortar joints on the downstream face could result in increased seepage through the dam and loosening of the stone blocks.

(5) An accumulation of debris in the transition channel and in the railroad culvert could impair discharge from the site.

(6) The trees and brush overhanging the transition channel should be removed to avoid the accumulation of obstructions in the channel.

SECTION 4: OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 OPERATIONAL PROCEDURES

a. General — The dam is used to create an impoundment on the Fivemile River for recreational purposes. Currently, discharge from the site only occurs over the spillway.

b. Description of any Warning System in Effect — No formal downstream warning system has been established.

4.2 MAINTENANCE PROCEDURES

a. General — There are no maintenance procedures currently in effect at the site.

b. Operating Facilities — There are no operable mechanisms associated with the dam that would require maintenance.

4.3 EVALUATION

The operation and maintenance procedures currently employed at the site are poor. Maintenance of the site should be scheduled regularly and annual technical inspections conducted. Records documenting these procedures should be kept for future reference. In addition, a formal downstream warning system should be established. Remedial measures and recommendations for the maintenance of the facility are presented in Section 7.

SECTION 5: EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 GENERAL

The watershed is 12.2 sq. mi. of heavily developed, rolling terrain. Due to the number of constrictions encountered at road crossings within the Fivemile River, it was assumed that the drainage area south of the Merritt Parkway (5.58 sq. mi.) contributes the major peak of the inflow hydrograph at Chasmars Pond. The spillway dam is arched in plan and is composed of a 77-foot-long, broad-crested spillway (crest El. 24.6) and two 7.5-foot-long abutments (El. 26.1). At the time of the inspection, the structure was in fair condition; however, some evidence of the deterioration of the mortar joints and seepage through and under the dam were observed. In addition, there are no low-level outlet works to drain the reservoir.

5.2 DESIGN DATA

No design data could be found for the original dam construction in 1900.

5.3 EXPERIENCE DATA

In October 1955 the USGS reported a flow of 2,140 cfs (366 csm) in the Fivemile River, approximately 3 miles north of Chasmars Pond Dam, in New Canaan, Connecticut, (Drainage Area 5.85 sq. mi.). However, no information concerning serious problem situations arising with the dam were found.

5.4 TEST FLOOD ANALYSIS

The maximum potential storage capacity of Chasmars Pond Dam (56 ac-ft) is within the lower limits of the small size category established by the Corps in the "Recommended Guidelines for Safety Inspection of Dams", dated September 1979. The hazard classification for the dam is HIGH, since there is the potential for the loss of more than a few lives

due to the breach of the dam. Based on the storage capacity, height, and hazard, the recommended test flood for this dam is between one-half the Probable Maximum Flood (1/2 PMF) and the Probable Maximum Flood (PMF). Since the size classification (SMALL) is marginal, based on the height and storage of the structure, the test flood will be equivalent to one-half the Probable Maximum Flood (1/2 PMF). Due to the number of constrictions encountered at road crossings within the Fivemile River, the inflow hydrograph at Chasmars Pond would have several peaks. Therefore, the portion of the drainage area south of the Merritt Parkway (5.58 sq. mi.) was assumed, conservatively, to contribute the major peak of the inflow hydrograph. The peak inflow to the pond due to 1/2 PMF in 5.58 sq. mi. of rolling watershed is 915 cfs/sq. mi. or 5,100 cfs.

The rise in the water surface within the impoundment due to the test flood inflow and outflow will be influenced by the railroad culvert located immediately downstream of the dam. From the outflow rating curve in Appendix D (sheet D-18) it is clear that the culvert will control at discharges in excess of 1,600 cfs. At a discharge of 1,600 cfs the dam is overtopped by approximately 1.6 feet. The headwater effects created by the culvert will cause the dam to be overtopped by a greater amount than if it were discharging freely. However, based on the past performance of the dam and its current condition it is anticipated that the dam has the ability to withstand some overtopping. The capacity of the spillway is 470 cfs with the water surface at the top of the dam (El. 26.1) or 9 percent of the routed test flood outflow (5,040 cfs). A considerably smaller test flood (2,950 cfs) was used in the Fivemile River Flood Control Study performed by Seelye, Stevenson, Value, and Knecht (see Appendix B).

5.5 DAM FAILURE ANALYSIS

Utilizing the "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs", dated April 1978, the failure outflow immediately downstream of the dam due to the water surface within the impoundment at the top of the dam was calculated to be 1,800 cfs. The

resulting breach width (37 feet) included the spillway section; therefore, the discharge of the spillway at the time of failure was subtracted from the breach outflow.

The failure of Chasmars Pond Dam will cause the water surface within the impact area to rise from 3.3 feet at a prefailure outflow of 470 cfs to 6.4 feet after the failure. The downstream stage due to the prefailure outflow would inundate 6 homes to a depth of one foot and the three homes behind the dike would experience less than a foot of flooding. Following the dam failure the first floors of 7 homes would be beneath approximately 4 feet of water and five additional homes would experience about 2 feet of flooding at the first floor elevation. In total, the dam breach would damage 12 homes, the bridge culverts at Carolyn Court, Jacob Street and Cudlipp Avenue and could potentially cause the loss of more than a few lives. The railroad culvert is not expected to attenuate the flood wave. Therefore, the dam has been classified as having a HIGH hazard potential.

SECTION 6: EVALUATION OF STRUCTURAL STABILITY

6.1 VISUAL OBSERVATION

The inspection did not reveal any indications of immediate stability problems. However, seepage was noted at the base of the dam near the right abutment, along the base of the right wing wall, and at the interface of the dam and the right wing wall. Much of the mortar between the stone blocks on the downstream face was missing, but there was no seepage observed at any of these joints. In addition, fines were noted in and around the 2-foot by 2-foot opening at the base of the dam near the right abutment. It was postulated that the opening, at one time, served as a drain or low-level outlet at the site. It has been recommended, however, that the nature of this outlet be investigated and the origin of the fine tan material that has accumulated near the opening be determined. At the present time, the conditions observed at the site are not considered to be immediate stability concerns.

6.2 DESIGN AND CONSTRUCTION DATA

There were no design and construction data available to perform an in-depth analysis and/or assessment of the structural stability of the dam.

6.3 POST-CONSTRUCTION CHANGES

There were no records available concerning post-construction changes of the dam.

6.4 SEISMIC STABILITY

The dam is in Seismic Zone 1 and, according to the Recommended Guidelines, need not be evaluated for seismic stability.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition — Based upon the visual inspection of the site and its past performance, the dam is in fair condition. No evidence of structural instability was observed in either the dam, the wing walls, or the large railroad culvert. However, deterioration of the masonry and seepage were observed at the base of the dam and wing wall near the right abutment. In addition, there is no operable low-level outlet to drain the pond.

Based on the "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs", dated April 1978, peak inflow to the reservoir is 5,100 cfs; peak outflow is 5,040 cfs with the dam overtopped by 10.5 feet. However, at discharges in excess of 1,600 cfs the railroad culvert will control. As a result, during the test flood the headwater effects of the culvert will cause the dam to be overtopped by a greater amount than if the structure was discharging freely. The hydraulic computations yield a spillway capacity of 470 cfs with the water surface at the top of the dam, which is equivalent to approximately 9 percent of the routed test flood outflow. When discharge from the site reaches 1,600 cfs the dam will be overtopped by approximately 1.6 feet.

b. Adequacy of Information — The information available is such that an assessment of the condition and stability of the dam must be based on the visual inspection, past performance of the dam, and sound engineering judgement.

c. Urgency — It is recommended that measures presented in Sections 7.2 and 7.3 be implemented within one (1) year of the owner's receipt of this report.

7.2 RECOMMENDATIONS

It is recommended that the following items be undertaken by a registered professional engineer qualified in dam design and inspection:

(1) Determine the origin of the seepage through the spillway and abutments and evaluate its influence on the structural stability of the dam. A program to reduce or stop this seepage should be developed depending on the severity of the problem.

(2) Investigate and evaluate the condition of the masonry dam when there is no flow over the spillway. A program for the repair of the mortar joints should be developed.

(3) Determine the function of the 2-foot by 2-foot opening and the origin of the fines that have accumulated near it.

(4) Assess the need for and means to provide a low-level regulating outlet that would allow drawdown of the pool.

(5) Perform a detailed hydraulic-hydrologic study to assess the influence of the upstream constrictions on the peak flood inflows at Chasmars Pond Dam and the dam's ability to withstand overtopping.

The owner should implement the recommendations of the engineer.

7.3 REMEDIAL MEASURES

a. Operation and Maintenance Procedures — The following measures should be undertaken within one (1) year of the owner's receipt of this report and continued on a regular basis.

(1) A formal program of operation and maintenance procedures should be instituted and documented to provide accurate records for future reference.

(2) Deteriorated areas of the masonry on the spillway crest, downstream face, and dam abutments should be repaired.

(3) All obstructions on the spillway crest and in the transition channel, including logs, rocks, and wood debris, should be removed.

(4) The brush, trees, stumps and root systems growing along the wing walls and above the railroad culvert should be removed and the resulting voids filled with a suitable material.

(5) An "Emergency Action Plan" should be developed that will include an effective preplanned downstream warning system; locations of emergency equipment, materials, and manpower; authorities to contact; and potential areas that require evacuation.

(6) Institute a program of annual technical inspection by a qualified registered engineer.

7.4 ALTERNATIVES

This study has identified no practical alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Chasmars Pond Dam

DATE 12/10/80

TIME 10:00 a.m.

WEATHER Hazy, overcast, 48°F

W.S. ELEV. 24.7

PARTY:	INITIALS:
1. Carol H. Cunningham	CC
2. Miron B. Petrovsky	MP
3. Ernst H. Buggisch	EB
4. Paul A. Archer	PA

PROJECT FEATURE:	INSPECTED BY:
1. Dam	CC, MP, PA
2. Culverts	MP, EB
3. Low-Level Outlet	MP
4. Spillway	CC, MP, PA

PERIODIC INSPECTION CHECK LIST

PROJECT: Chasmars Pond Dam

DATE: 12/10/80

PROJECT FEATURE: Dam

NAME: CC, MP, PA

AREA EVALUATED	CONDITION
DAM	
Crest Elevation	24.6
Current Pool Elevation	24.7
Maximum Impoundment to Date	Unknown
Surface Cracks	None
Pavement Condition	N/A
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutments	Evidence of seepage was noted.
Indications of Movement of Structural Items	None
Trespassing on Slopes	N/A
Sloughing or Erosion of Slopes or Abutments	N/A
Rock Slope Protection - Riprap Failures	N/A
Unusual Cracking	One stone block missing on crest near left abutment. Mortar missing in many joints.
Unusual Downstream Seepage	Most predominant at opening near right wing wall at base of dam.
Piping or Boils	N/A
Foundation Drainage Features	N/A
Toe Drains	N/A
Instrumentation System	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: Chasmars Pond Dam DATE: 12/10/80

PROJECT FEATURE: Dam (Continued) NAME: CC, MP, PA

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	N/A
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	N/A
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECK LIST

PROJECT: Chasmars Pond Dam

DATE: 12/10/80

PROJECT FEATURE: Culverts

NAME: MP, EB

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	N/A
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	
	Note: The outlet works consist of two masonry culverts through the railroad embankment. The large culvert is in generally good condition with no signs of serious deterioration. The brick lining and masonry trim are intact. No obstructions were noted in the bottom of the culvert. The small culvert, located 100 feet from the left abutment, is no longer usable. The channel leading to this culvert is full of debris and a 60-foot-long portion of it has been filled in adjacent to the culvert opening. The culvert entrance is barely visible above the soil fill.

PERIODIC INSPECTION CHECK LIST

PROJECT: Chasmars Pond Dam DATE: 12/10/80

PROJECT FEATURE: Low-Level Outlet NAME: MP

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Masonry	Fair
Rust or Staining	N/A
Spalling	None
Erosion or Cavitation	None
Visible Reinforcing	N/A
Any Seepage or Efflorescence	Seepage of 10 to 15 gpm from outlet with an accumulation of fine material in and around outlet.
Condition at Joints	Mortar missing between stone blocks.
Drain holes	N/A
Channel	N/A
Loose Rock or Trees Overhanging	
Condition of Discharge Channel	

PERIODIC INSPECTION CHECK LIST

PROJECT: Chasmars Pond Dam DATE: 12/10/80

PROJECT FEATURE: Spillway NAME: CC, MP, PA

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	Chasmars Pond
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Wing Walls	
General Condition of Masonry	Fair
Rust or Staining	N/A
Spalling	One block missing on spillway crest near left abutment.
Any Visible Reinforcing	N/A
Any Seepage or Efflorescence	Downstream spillway face obscured by flow. Efflorescence noted on wing wall joints.
Drain Holes	N/A
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Along top of wing walls and culvert.
Floor of Channel	Large log near left wing wall and several rocks within channel.
Other Obstructions	Crude dike in river bed immediately downstream of railroad embankment.

PERIODIC INSPECTION CHECK LIST

PROJECT: Chasmars Pond Dam DATE: 12/10/80

PROJECT FEATURE: Spillway (Continued) NAME: CC, MP, PA

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	
a. Super Structure	N/A
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	N/A
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

PERIODIC INSPECTION CHECK LIST

PROJECT: Chasmars Pond Dam DATE: 12/10/80

PROJECT FEATURE: Not Applicable NAME:

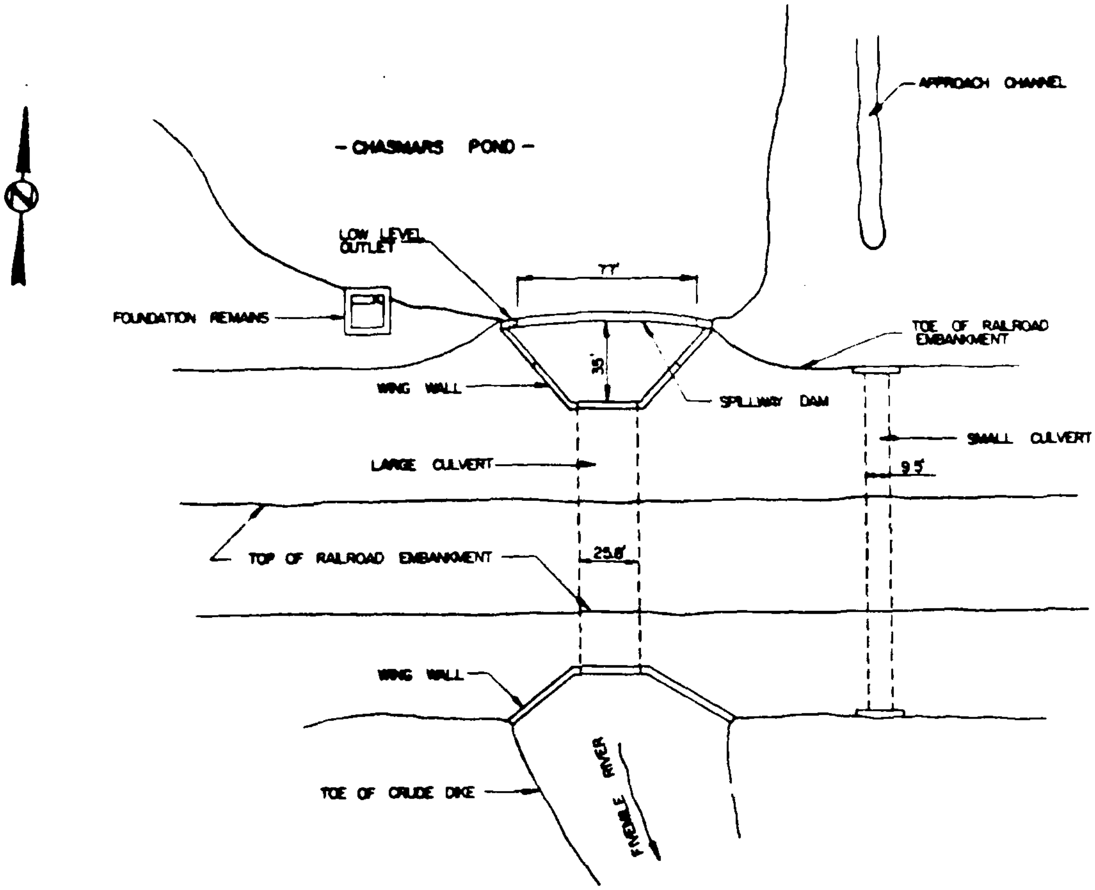
AREA EVALUATED	CONDITION
<u>OUTLETS WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u>	
a. Approach Channel	N/A
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	N/A
Condition of Concrete	
Stop Logs and Slots	

APPENDIX B

ENGINEERING DATA

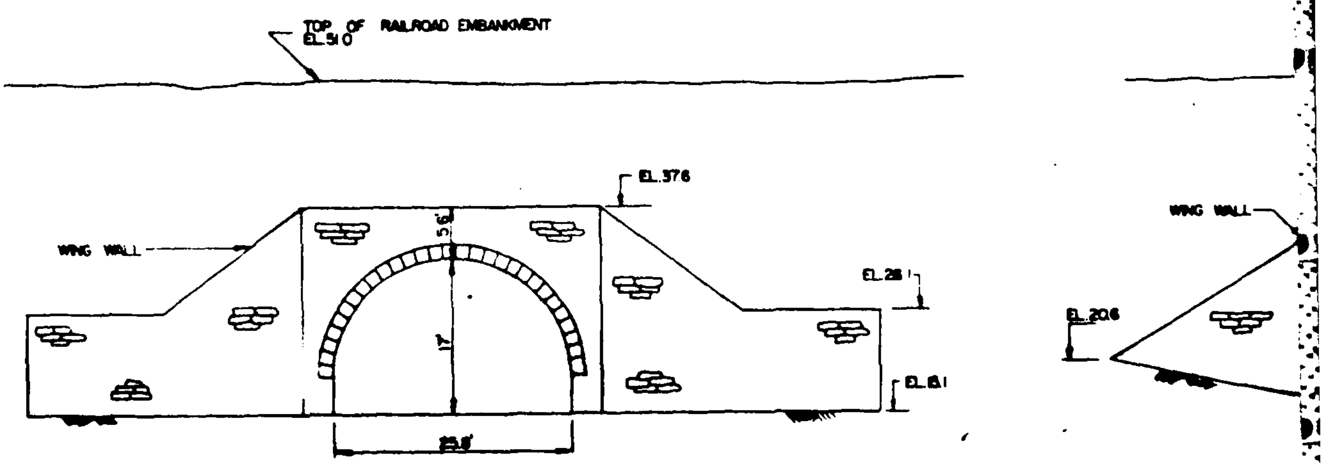
SUMMARY OF DATA AND CORRESPONDENCE

DATE	TO	FROM	SUBJECT	PAGE
2/81	---	---	Plan and Sections	B-2
7/16/64	---	---	Water Resource Inventory Data	B-3
10/58	Norwalk Flood Control and Erosion Commission	Seelye, Stevenson, Value, and Knecht Civil Engineers	Norwalk Flood Control	B-4



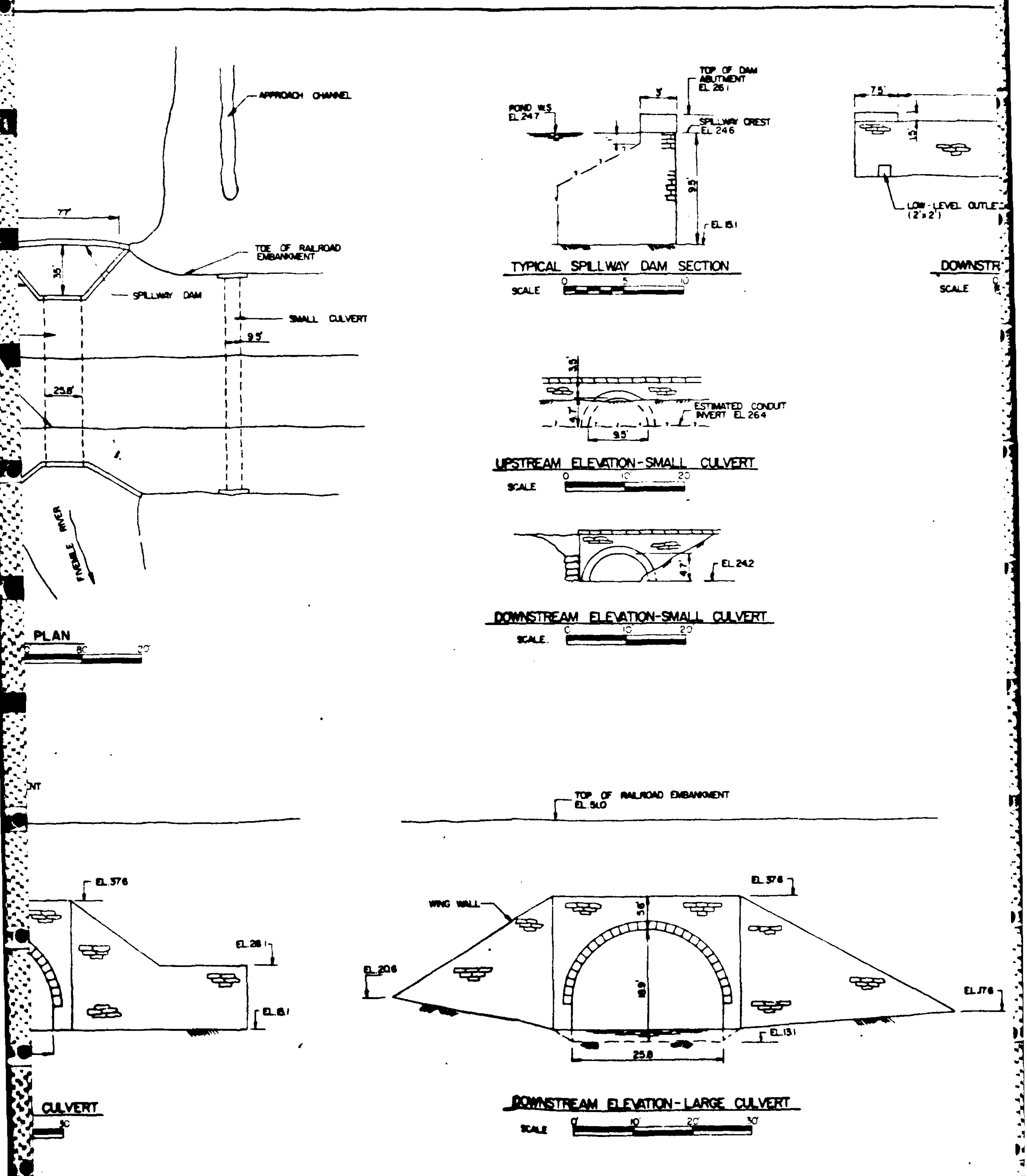
PLAN

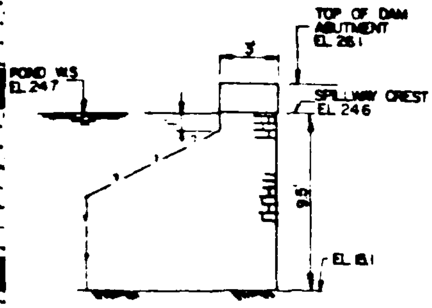
SCALE 0' 40' 80' 120'



UPSTREAM ELEVATION - LARGE CULVERT

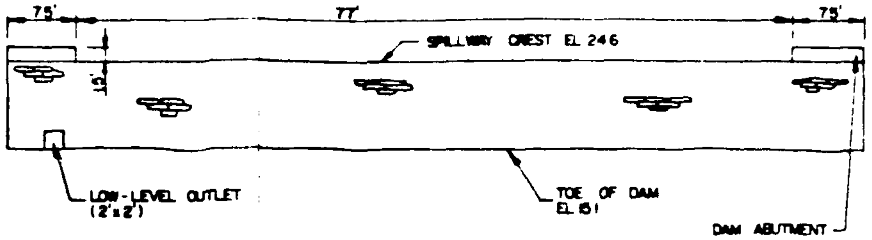
SCALE 0' 10' 20' 30'


APPROACH CHANNEL
77'
35'
TOE OF RAILROAD EMBANKMENT
SPILLWAY DAM
SMALL CULVERT
9.5'
25.8'
FIVEMILE RIVER
PLAN
TOP OF DAM ABUTMENT EL 26.1
3'
POND W.S. EL 24.7
SPILLWAY CREST EL 24.6
9.5'
EL 15.1
TYPICAL SPILLWAY DAM SECTION
SCALE
7.5'
1.5'
LOW-LEVEL OUTLET (2'x2')
DOWNSTR
SCALE
ESTIMATED CONDUIT INVERT EL 26.4
9.5'
UPSTREAM ELEVATION-SMALL CULVERT
SCALE
EL 24.2
4.7'
DOWNSTREAM ELEVATION-SMALL CULVERT
SCALE
PLAN
TOP OF RAILROAD EMBANKMENT EL 51.0
EL 37.6
EL 28.1
EL 15.1
CULVERT
WING WALL
EL 37.6
5.6'
EL 20.6
18.9'
EL 17.6
EL 13.1
25.8
DOWNSTREAM ELEVATION-LARGE CULVERT
SCALE



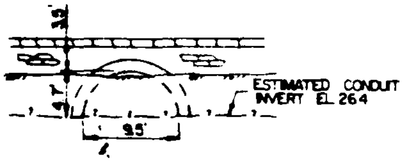
TYPICAL SPILLWAY DAM SECTION

SCALE 0 5 10



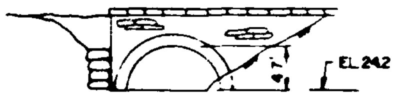
DOWNSTREAM ELEVATION-SPILLWAY DAM

SCALE 0 10 20 30



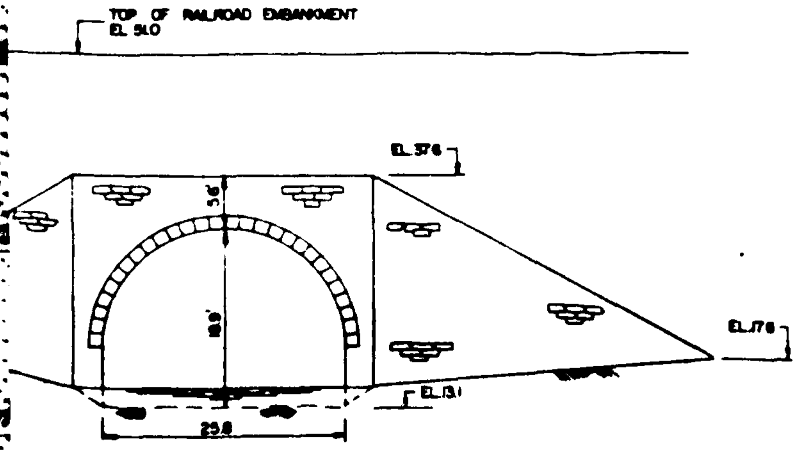
STREAM ELEVATION-SMALL CULVERT

SCALE 0 10 20



WNSTREAM ELEVATION-SMALL CULVERT

SCALE 0 10 20



DOWNSTREAM ELEVATION-LARGE CULVERT

SCALE 0 10 20 30

NOTES:

1. THIS PLAN WAS COMPILED FROM THE DRAWINGS PREPARED BY SEELYE, STEVENSON, VALUE, AND KNECHT CONSULTING ENGINEERS DURING A FLOOD IMPACT STUDY OF FIVEMILE RIVER (1958) FOR THE TOWN OF NORWALK AND SUPPLEMENTARY FIELD OBSERVATIONS MADE BY IECO ENGINEERS
2. ELEVATIONS WERE TAKEN FROM THE 1958 FLOOD IMPACT STUDY DRAWINGS AND THE TOPOGRAPHIC MAPS SUPPLIED BY THE NORWALK DEPARTMENT OF PUBLIC WORKS
   ALL ELEVATIONS ARE REFERENCED TO NGVD
3. THE UPSTREAM SLOPE OF THE SPILLWAY DAM COULD NOT BE DETERMINED DURING THE FIELD INVESTIGATION. THE UPSTREAM ENTRANCE INVERT TO THE SMALL CULVERT WAS BURIED AT THE TIME OF THE FIELD INSPECTION.

INTERNATIONAL ENGINEERING CO. DARIEN, CONNECTICUT ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FEDERAL DAMS

PLAN, ELEVATIONS AND SECTIONS

CHASMARS POND DAM

FIVEMILE RIVER — NORWALK - DARIEN, CONNECTICUT

DRAWN BY	CHECKED BY	APPROVED BY	SCALE AS NOTED
[illegible]	[illegible]	[illegible]	DATE FEB 1981 — SHEET B-1

12 CT3

No. NW 20

WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA

Long. 73°-26.4'
Lat. 41°-4.7'

Inventoried By LWS

Date 16 JULY 1964

Name of Dam or Pond Chasmars Pond.

Code No. FV 1.5

Nearest Street Location ROWAYTON AVENUE

Town NORWALK

U.S.G.S. Quad. NORWALK SOUTH

Name of Stream FIVEMILE RIVER

Owner JOHN R. TUNIS

Address 315 ROWAYTON AVENUE
NORWALK (ROWAYTON)

Pond Used For RECREATION DA 12.25M

Dimensions of Pond: Width 400 FEET Length 1000 FEET Area ~~10~~ 9 ACRES

Total Length of Dam 70 FEET Length of Spillway 60 FEET

Location of Spillway CENTER OF DAM

Height of Pond Above Stream Bed 10 FEET

1900?

Height of Embankment Above Spillway 1 FOOT

Type of Spillway Construction CONCRETE

Type of Dike Construction MASONRY

Downstream Conditions HOUSES, LONG ISLAND SOUND

Summary of File Data LETTER DATED 11-17-55 FROM DEAN CLARK SAYING THAT PARTIAL FAILURE OF DAM IN 1955 DID CAUSE DAMAGE

Remarks

Would Failure Cause Damage? YES Class B

SEELYE STEVENSON VALUE & KNECHT
101 PARK AVENUE
NEW YORK, NEW YORK

Flood Control and Erosion Commission
Norwalk, Connecticut

<u>Report on the Fivemile River</u>

October, 1958

Note: Selected portions of study pertaining to inspection area.

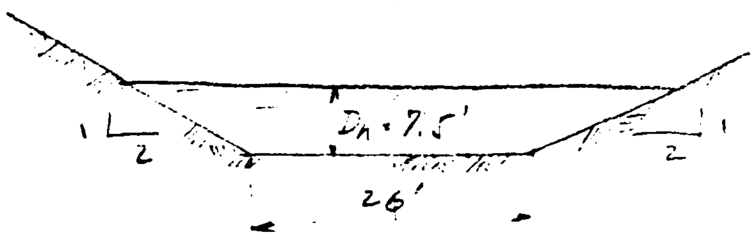
COMPUTE A_{n_2} = ½ [illegible] = [illegible] FT² ∴

$$h_1^* = 1.41 + 1.0\left[\left(\frac{211}{376}\right)^2 - \left(\frac{211}{520}\right)^2\right] 2.02 = \underline{1.71 \text{ FT}}$$

MAX. BACKWATER EL: 27.3 + 9.7 + 1.7 = 38.7
TOP OF RD 37.9
OVERFLOW DEPTH 0.8 FT

BECAUSE THE BACKWATER IS NOT EXCESSIVE (1.7 FT) IF THE APPROACH CHANNEL & OUTLET CHANNEL IS CLEANED OUT THIS BRIDGE WILL BE PROBABLY ADEQUATE.

TYPICAL IMPROVED CHANNEL SECTION:



[illegible]

THE DEPTH OF FLOW 7.5 [illegible]

$A = 307.5$ FT²
$R = 5.16$
$R^{2/3} = 5.16^{2/3} = 2.986$

USE $n = 0.40$ (THE EXISTING TREES ON THE EMBANKMENT HAVE TO BE REMOVED WHEN CHANNEL IS EXCAVATED)

$$Q = (307.5)\left(\frac{1.486}{0.040}\right)(2.986)(0.0716) = 2{,}410 \text{ CFS} = 2{,}410 \text{ CFS DESIGN}$$

CHECK BRIDGE

$$m = \left(\frac{307.5 - 194.0}{307.5}\right)100 = 37\%$$

FROM FIG # 4 $K_L = 0.55$ [illegible]

$$\frac{V_{n2}^2}{2g} = \frac{\left(\frac{2{,}410}{194.0}\right)^2}{64.4} = 2.39 \qquad K_L^* = 2.39 [illegible] = 1.32 \text{ FT}$$

$$h_1^* = 1.32 + 1.0\left[\left(\frac{194}{307.5}\right)^2 + \left(\frac{194}{381}\right)^2\right] 2.39 = \underline{1.[illegible]}$$

0.397 0.255

SEELYE STEVENSON VALUE & KNECHT — CONSULTING ENGINEERS — NEW YORK CITY

JOB [illegible] NOTES BY [illegible] DATE [illegible] PAGE NO. 17

CHECK BY ______ DATE ______

MAX BACKWATER 27.3 + 7.5 + 16.0 + 3.5 [illegible]
TOP OF RD [illegible] 37.9
CLEARANCE 1.5 ft [illegible]

THERE IS NO UNDER CLEARANCE AT THE [illegible], HOWEVER WITH ENOUGH FREQUENT MAINTENANCE (CLEANING OF THE DEBRIS) THE STRUCTURE CAN BE [illegible] ADEQUATE. NO DAMAGE WILL OCCUR FROM THE BACKWATER.

CHECK SPILLWAY AT SECTION C'-C'

Q_{DES} = 2,950 CFS

USE BROAD CRESTED WEIR FORMULA: $Q = 3.087\, L\, H^{3/2}$

$$H = \left(\frac{Q}{3.087\, L}\right)^{2/3} = \left(\frac{2,950}{(3.087)\,75}\right)^{2/3} = 12.7^{2/3} = 5.40 \text{ ft}$$

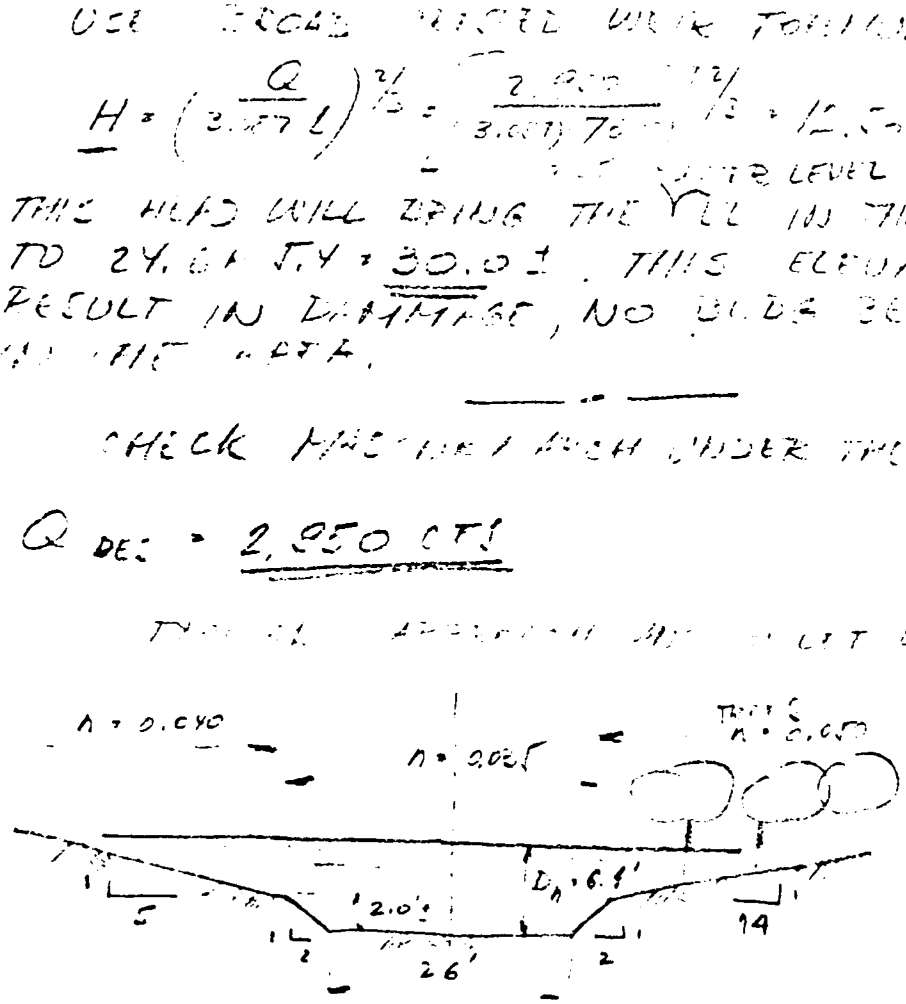
WATER LEVEL

THIS HEAD WILL BRING THE W.L. IN THE [illegible] POND TO 24.6 + 5.4 = 30.0 ft. THIS ELEVATION WILL NOT RESULT IN DAMMAGE, NO BLDG BEEING THAT LOW IN THE AREA.

CHECK MASONRY ARCH UNDER THE N.Y. N.H. RAILROAD

Q DES = 2,950 CFS

TYPICAL APPROACH AND OUTLET CHANNEL SECTION



S_n = 0.007

$S^{1/2}$ = 0.0836

... FLOW 6.1 Ft

$A_1 = \left(\frac{26+24}{2}\right)(2.0) + (34.0)(4.1) = 199.4\,ft^2$ $P = ... = 35.0\,ft$

$R_1 = \frac{199.4}{35.0} = 5.70$, $R^{2/3} = 5.70^{2/3} = 3.191$

$Q_1 = (199.4)\left(\frac{1.486}{0.035}\right)(3.191)(0.0836) = 2,260$ CFS $V_1 = 11.3$ Ft/sec

$K_1 = 27,000$

$A_2 = 1/2\,(4.1)(20.5) = 42.0\,ft^2$ $P_2 = 21.0$ ft $R_2^{2/3} = \frac{42.0}{21.0}^{2/3} = 2^{2/3} = 1.587$

$Q_2 = (42.0)\left(\frac{1.486}{0.040}\right)(1.587)(0.0836) = 207$ CFS $V_2 = 4.9$ ft/sec

$K_2 = 2,480$

$A_3 = 1/2\,(4.1)(57.4) = 117.5\,ft^2$ $P_3 = 59.0$ ft $R_3^{2/3} = \frac{117.5}{59}^{2/3} = 1.99^{2/3} = 1.582$

$Q_3 = (117.5)\left(\frac{1.486}{0.050}\right)(1.582)(0.0836) = 465$ CFS $V_3 = 3.9$ ft/sec

$K_3 = 5,560$

$\Sigma Q = \overline{2,932}$ CFS $\cong 2,950$ CFS = DESIGN RUN-OFF

$\Sigma A_n = 358.9$ $\Sigma K = 35,040$

$S_0 = \left(\frac{2,932}{35,040}\right)^2 = 0.0836^2 = 0.007$ OK

$q_1 V_1^2 = (2,260)(113) = 255,000$

$q_2 V_2^2 = (207)(4.9) = 1,030$

$q_3 V_3^2 = (465)(3.9) = 1,815$

$\Sigma q v^2 = 257,845$

$\alpha = \left[\frac{257,845}{(2,932)\left(\frac{2,932}{358.9}\right)^2}\right] = 1.32$

BRIDGE WATERWAY AREA $(25.7)(6.1) = 157 \text{ ft}^2$

$$m = \left[\left(\frac{207 + 465 + 480}{2,932}\right) 100\right] = 39\%$$

FROM FIG. 4 $K_b = 0.97$ (90° VERT WALLS)

EXCENTRICITY -

$$e = \left[1 - \left(\frac{207}{465}\right)\right] = 0.555 \quad \therefore \quad \Delta K_e = 0.0$$

NO SKEW - NO PIERS, $\frac{V_{n2}^2}{2g} = \frac{\left(\frac{2,932}{157}\right)^2}{64.4} = 5.43$

$$K_b^* = (0.97)(5.43) = 5.26$$

$$h_1^* = 5.26 + 1.32\left[\left(\frac{157}{357.9}\right)^2 - \left(\frac{157}{1000}\right)^2\right] 5.26 = \underline{\underline{6.41 \text{ ft}}}$$

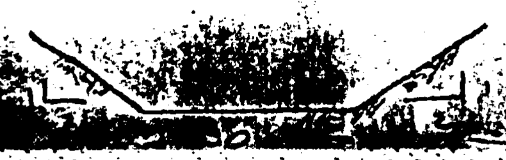
ALTHOUGH 6.4 FT BACKWATER IS NOT RECOMMENDED IN AN ORIGINAL DESIGN, IN THIS PARTICULAR CASE NO DAMAGE WILL OCCURE FROM THIS BACKWATER, AND THE CLEARENCE TO THE TOP OF R.R. AND UNDERCLEARENCE IS MORE THAN SATISFACTORY, THEREFOR THIS BRIDGE IS <u>ADEQUATE</u>.

MAX. BACKWATER 13.1 + 6.1 + 6.4 = <u>25.6</u> FT

— o —

CHANNEL BETWEEN N.Y.N.H. R.R AND COULIPP STREET.

THE UPPER PORTION OF THIS REACH SHOULD BE IMPROVED. THERE IS A BEND RIGHT [illegible] UPSTREAMS FROM THE RAIL ROAD BRIDGE. THE WATER WILL SHOOT WITH TREMENDEOUS MOMENTUM (KINEMATIC ENERGY) FROM THE BRIDGE AND WILL FLOOD THE LOW LAYING BUILDINGS. IT IS SUGGESTED THAT THE BEND BE CUT THROUGH AND THE CHANNEL BOTTOM LOWERED TO MEET THE EXISTING BOTTOM AT APPX. 50-0 FT UPSTREAM. THE TYPICAL CHANNEL SECTION IS AS FOLLOWS



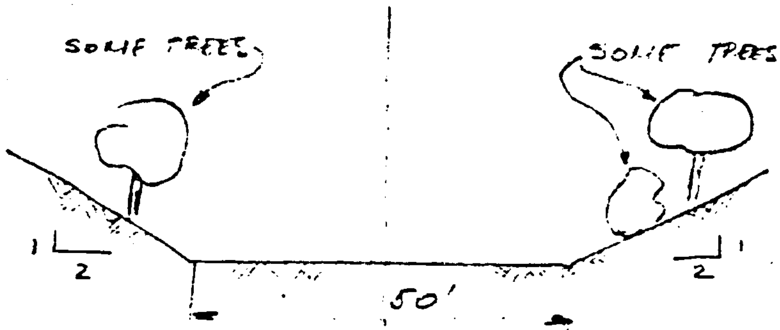
CHECK BRIDGE STRUCTURE AT [illegible] STREET
SECT. A-A & B-B

THIS STRUCTURES WILL BE ANALYSED FIRST BY ASSUMING NORMAL HIGHTIDE. IN THIS CASE THE NORMAL DEPTH OF FLOW IS GOVERNING.

$Q_{DS} = 2,975$ cfs

$S_N = 0.007 \therefore S^{1/2} = 0.0836$

TYPICAL APPROACH CHANNEL SECTION



TRY DEPTH OF FLOW 6. Ft.

$n = 0.045$

$A = 372.0$ ft^2 $R = 4.84$ &
$R^{2/3} = 4.84^{2/3} = 2.862$

$Q = (372.0)\left(\frac{1.486}{0.045}\right)(2.862)(0.0836) = 2,940$ cfs $\approx 2,975$ cfs = DESIGNE RUN-OFF ok

$V_n = \frac{2,940}{372} = 7.9$ ft/sec

$m = \left[\frac{372.0 - (6.0)(49.10)}{372.0}\right] 100 = 21\%$

FROM FIG # 4 $K_b = 0.45$ (VERT. WALLS)

$A_p = (6.0)(3.7) = 22.2$ say 25.0 ft^2 (BOTTOM PORTION OF ARCH)

$J = \frac{25}{295} = 0.085$ FROM FIG # 5 $\frac{\Delta K_p}{J} = 2.0 \therefore$

$\Delta K_p = (0.085)(2.0) = 0.17$

NO EXCENTRICITY - NO APPRECIABLE SKEW.

$\frac{V_{n2}^2}{2g} = \frac{\left(\frac{2,975}{[illegible]}\right)^2}{64.4} = \frac{10.1^2}{64.4} = 1.60$

$h_b^* = (0.45 + 0.17)(1.60) = 0.99$ Ft

$h_1^* = (0.99) + \left[(1.0)\left(\frac{295}{372}\right)^2 - \left(\frac{295}{448}\right)^2 \right] 1.60 = \underline{1.30 \text{ Ft}}$

COMPUTE BACKWATER FOR DUAL BRIDGE

$L_d = 60 \quad \therefore \quad \frac{L_d}{h_1} = \frac{60 \times [illegible]}{295} = 10.[illegible]$

ENTER FIG. #12 WITH ABOVE VALUE & M = 21.[illegible], σ_d = 1.44

$h_d^* = \sigma_d h_1^* = 1.44(1.30) = \underline{1.87}$ Ft (BACKWATER DUE TO DUAL BRIDGE)

MAX HIGHWATER EL = 9.5 + [illegible] + 1.87 = [illegible] SAY $\underline{2.90}$

IN CASE OF SIMULTANEOUS HIGH TIDE (EL 11.0) AND 5 TIMES MEAN ANNUAL FLOOD THE DUAL BRIDGES UNDER COOLIPP STREET WILL ACT AS SUBMERGED ORIFICES.

COMPUTE HIGHWATER LEVEL EL FOR THE MAIN BRIDGE (R. CONCR. THE ONE WHICH IS DOWNSTREAM)

WATERWAY AREA $\left(\frac{8.6 + 11.7}{2}\right) \times 53.3 = 540$ Ft^2

ASSUME C = 0.7

ASSUME $D_n = 11.0 \quad \therefore \quad V_{n} = \frac{2975}{671} = 4.4$ Ft/Sec

$H = \frac{Q^2}{(CA)^2 \, 64.4} - \frac{V_n^2}{2g} = \frac{2975^2}{(540^2 \times 0.7^2)(64.4)} - \frac{4.4^2}{64.4} = [illegible]$

$- 0.30 = \underline{0.66 \text{ Ft}}$

HIGH WATER EL UPSTREAM OF 1st BRIDGE = HIGH TIDE EL : 11.00 + HEAD [illegible] = 11.66 ≈ $\underline{11.70}$

CONCLUSION: THIS R.CONCRETE BRIDGE IS ADEQUATE, IF THERE IS ANY DAMAGE FROM EL : 11.0

THAT MEANS FROM THE HIGH TIDE THE ADDITIONAL 0.7 ft HEADLOSS DUE TO THE BRIDGE WILL NOT INCREASE THIS DAMAGE. IT WOULD BE UNECONOMICAL TO DESIGN A BRIDGE WITH LESS THAN 0.70 ft HEADLOSS.

CHECK STONE ARCH BRIDGE AS A SUBMERGED ORIFICE

WATERWAY AREA $(2)(5.0)(22.70) + (2)(2/3)(22.70)(5.0) = 378.5 ft^2$

$C = 0.75$ - ASSUME DEPTH OF FLOW 12 ft $\therefore V_{approach} = \frac{2{,}975}{888} = 3.4$ ft/sec

$$H = \left[\frac{2975^2}{(0.75^2)(378.5^2)\,64.4}\right] - \frac{3.4^2}{64.4} = \left(\frac{8\,850\,000}{5{,}180\,000}\right) - 0.18 = \underline{1.53} \text{ ft}$$

MAX BACKWATER DUE TO BOTH BRIDGES

$= 11.70 + 1.53 = 13.23$ SAY 13.30

THE TOP OF RD IS APPX 13.30 THEREFORE THERE IS NO FREEBOARD AVAILABLE. CERTAIN DAMAGE WILL RESULT FROM THIS HIGH WATER ELEVATION, IT IS SUGGESTED THAT THIS BRIDGE SHOULD BE REMOVED.

APPENDIX C

PHOTOGRAPHS

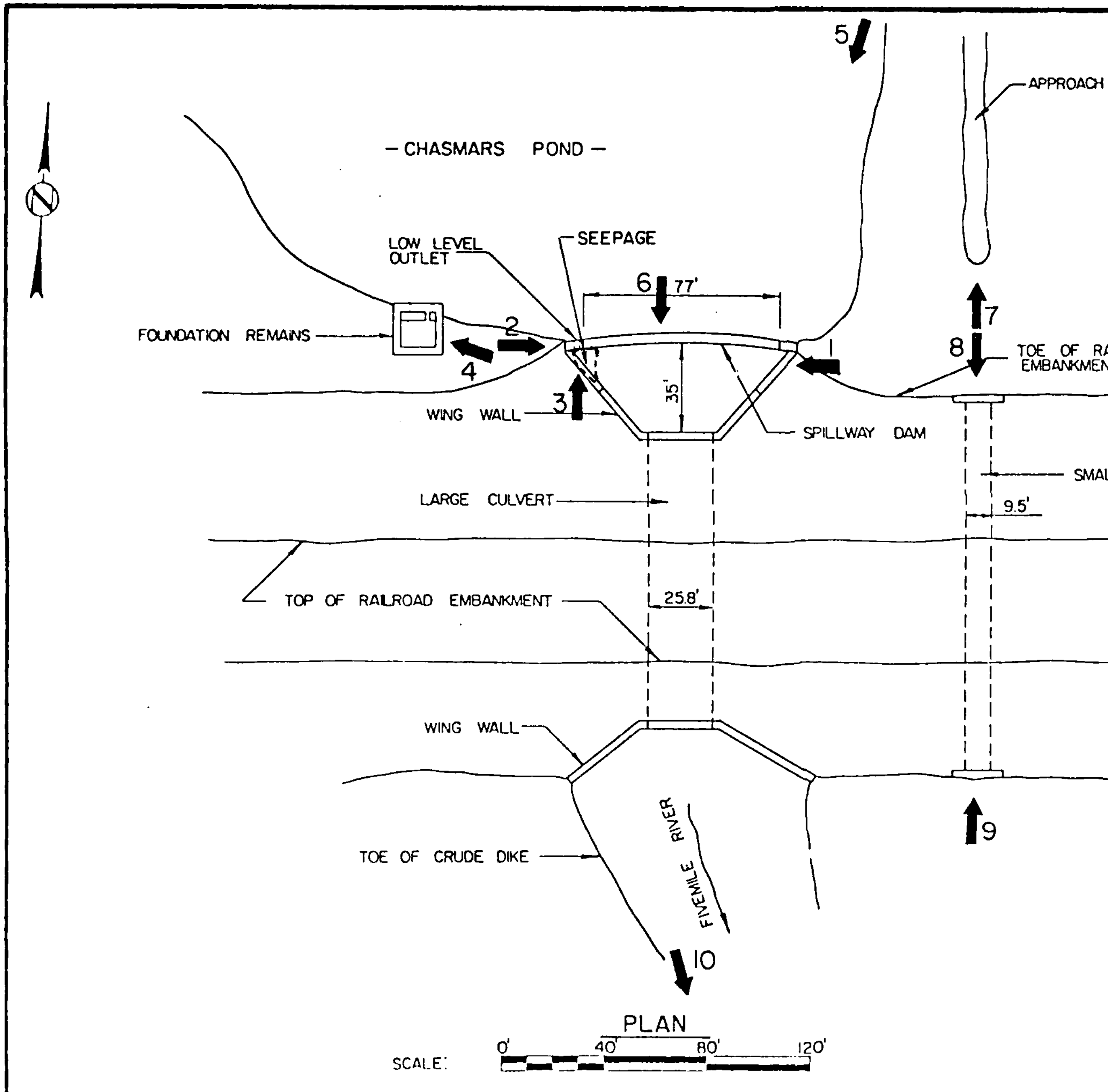


PHOTO LOCATION PLAN

CHASMARS POND DAM

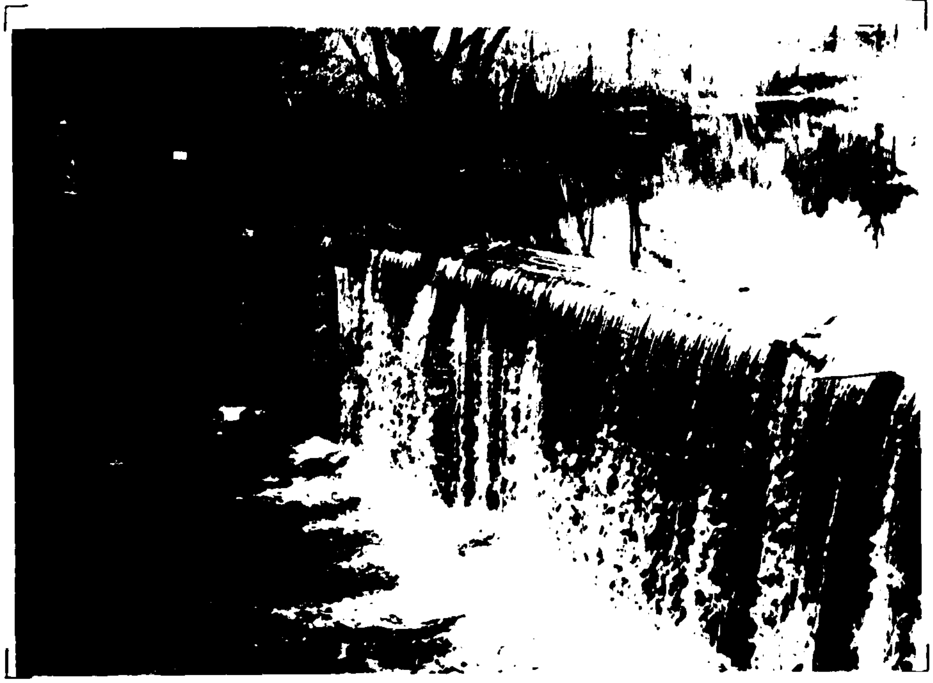


Photo 1 Dam, right wing wall at abutment, and transition channel.

Photo 2 Dam, left wing wall at abutment, and transition channel.

Photo 3 Low-level outlet at base of dam near right abutment.

Photo 4 Remains of foundation near right dam abutment.

Photo 5 Spillway crest, railroad embankment, and large culvert.

Photo 6 Brick lined railroad culvert. Note crude dike in background.

Photo 7 Approach Channel for small culvert.

Photo 8 Upstream Intake of small culvert.

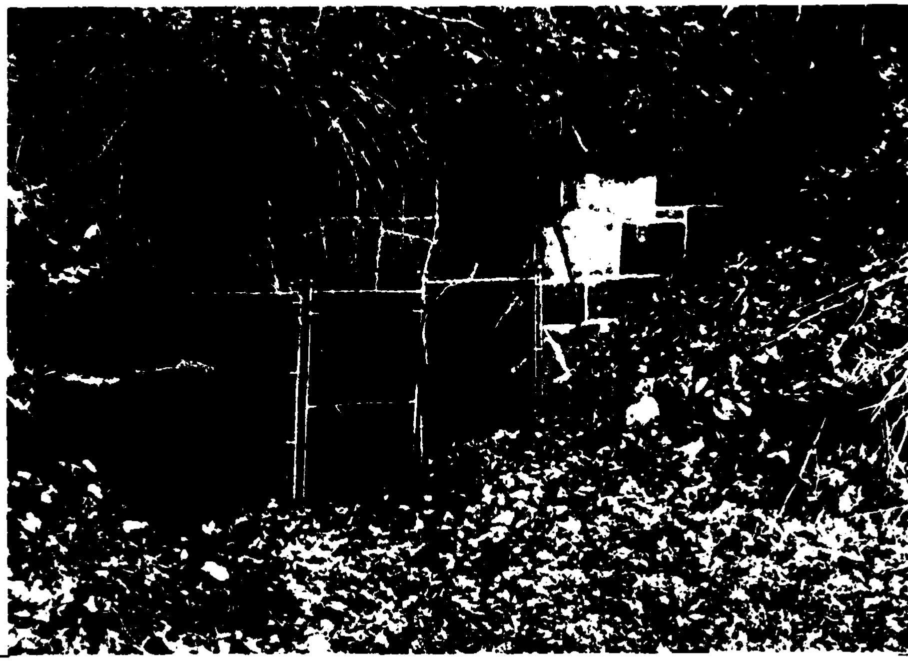


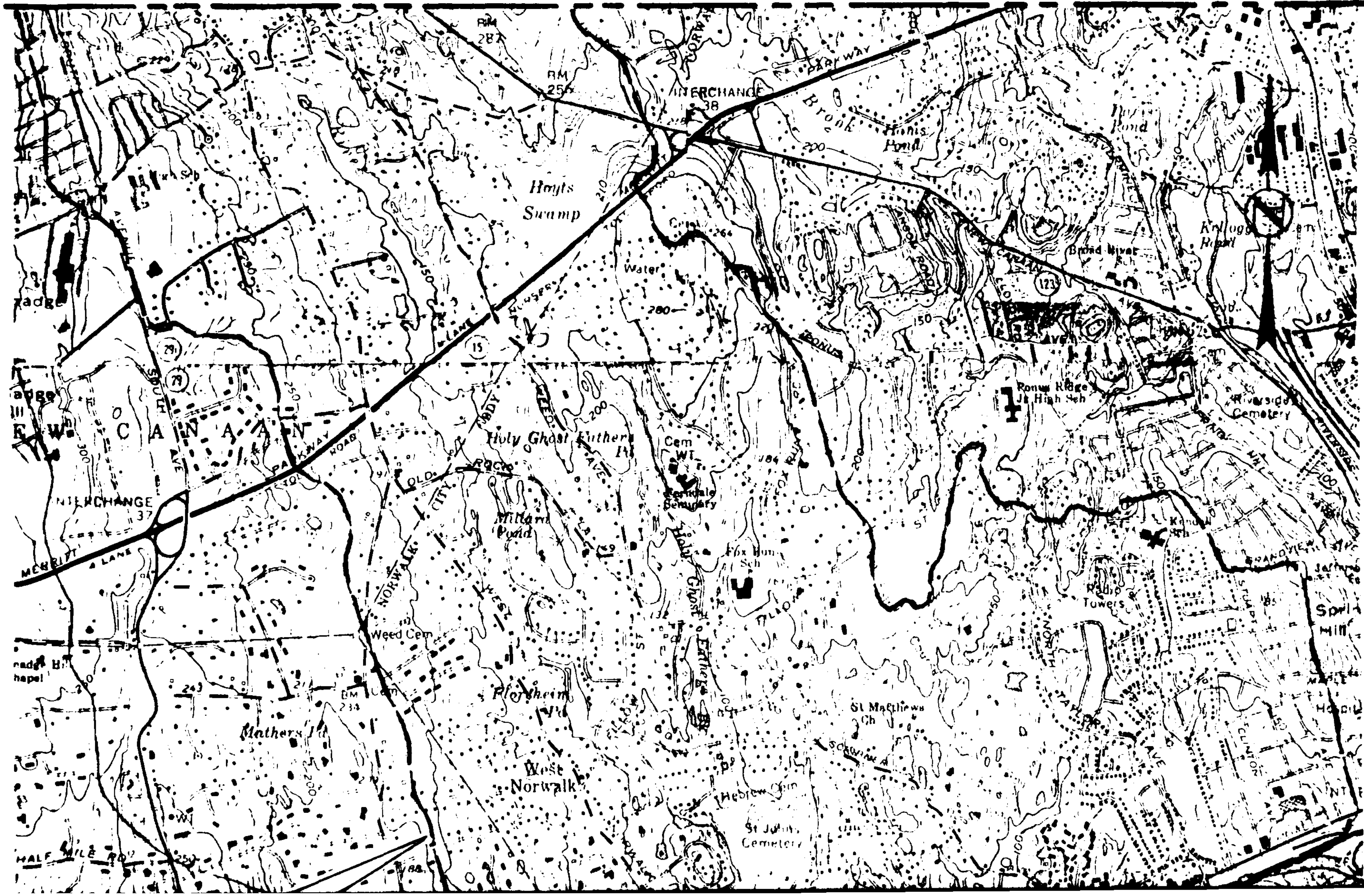
Photo 9 Downstream outlet of small culvert.

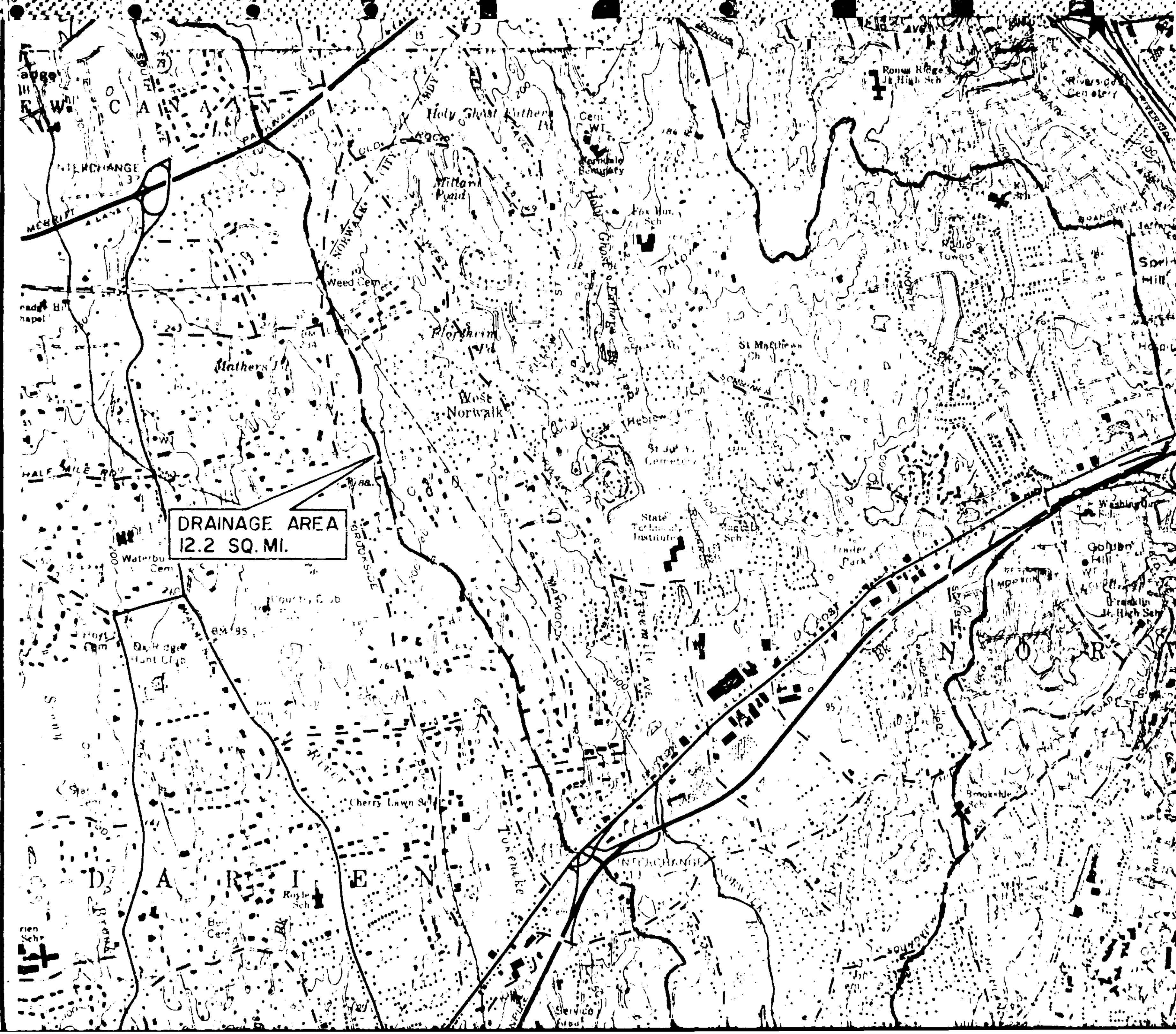
Photo 10 Downstream home along Fivemile River within impact area.

APPENDIX D

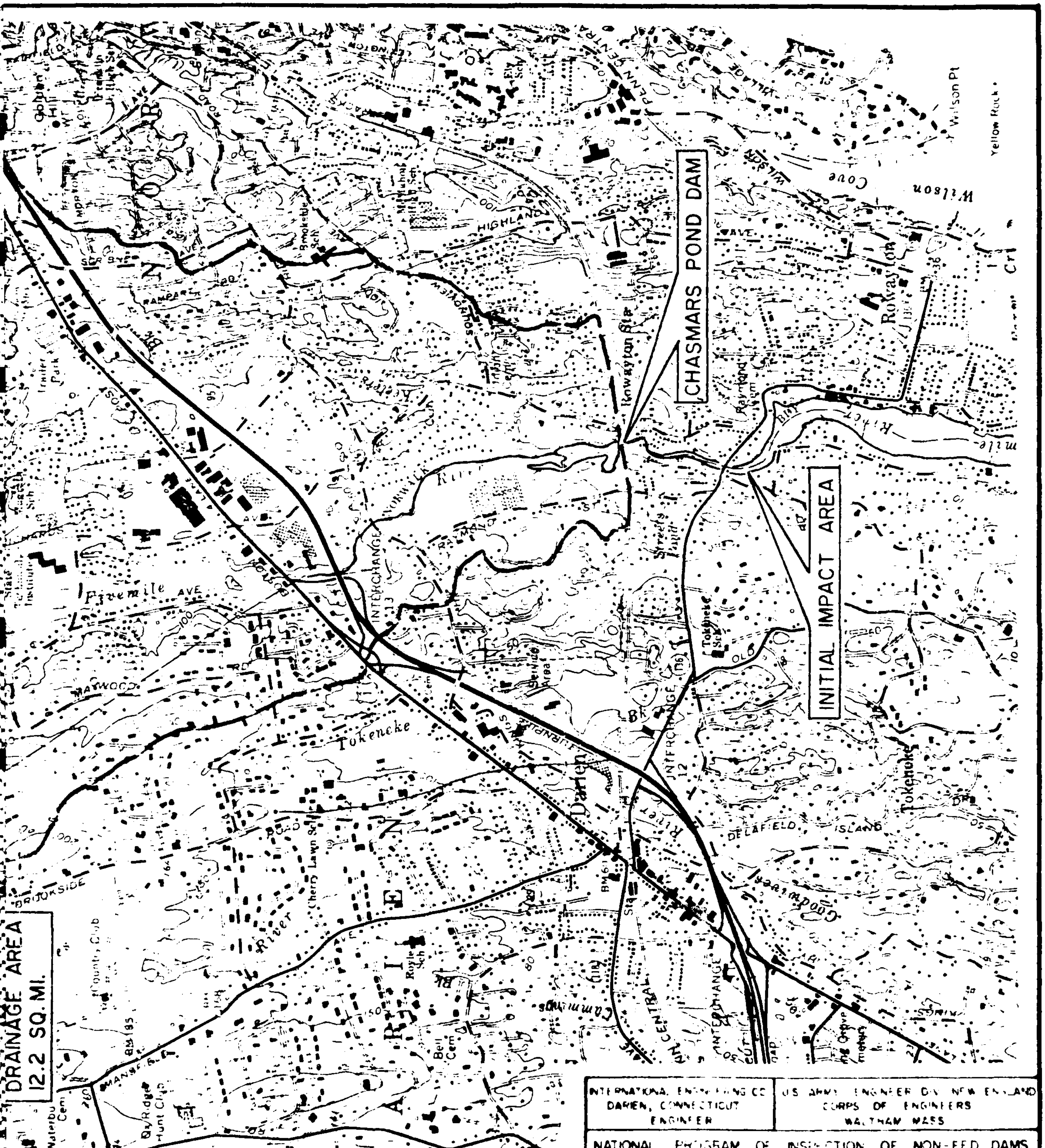
HYDROLOGIC AND HYDRAULIC COMPUTATIONS

MATCH LINE SEE SHEET D-2





DRAINAGE AREA
12.2 SQ. MI.
West Norwalk
Holy Ghost Fathers
Millard Pond
Mathers Pd
Pforzheim Pd
Weed Cem
State Technical Institute
St Matthews Ch
Fox Run Sch
Riverside Cemetery
Ronus Ridge Jr High Sch
Fivemile AVE
Tokeneke
Cherry Lawn Sch
Royle Sch
Country Club
INTERCHANGE
MERRITT
PARKWAY
HALF MILE RD
BROOKSIDE
MAYWOOD
NORWALK
D A R I E N
N O R



INTERNATIONAL ENGINEERING CO DARIEN, CONNECTICUT ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

DRAINAGE AREA MAP

CHASMARS POND DAM

FIVEMILE RIVER **NORWALK, CONNECTICUT**

DWN BY	CKD BY	APP BY	SCALE 1"=2000'
			DATE APRIL [illegible] / SHEET B-1

DRAINAGE AREA
12.2 SQ. MI.
LEWISBORO
NEW YORK
CONNECTICUT
WESTCHESTER CO
FAIRFIELD CO
John D Milne Lake
Grupes Reservoir
Rusche Ridge
Smith Ridge
HUCKLEBERRY HILLS
New Canaan Reservoir
Vista
Finneys Corners
North Wilton
Kents Pond
Bald Hill
Pine Hill
Brook


DRAINAGE AREA
12.2 SQ.MI.
HUCKLEBERRY HILLS
Smith Ridge
New Canaan Reservoir
NEW CANAAN
Brushy Ridge
Silvermine Hill
Ferris Hill
Canoe Hill
Pine Hill
Silvermine Pond
Thayer Pond
Grupes Reservoir
Garden Center Cem
New Canaan Country Club
Pinneys Corners

2

INTERNATIONAL ENGINEERING CO. DARIEN, CONNECTICUT ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

DRAINAGE AREA MAP
CHASMARS POND DAM

FIVEMILE RIVER **NORWALK, CONNECTICUT**

DWN BY	CKD BY	APP BY	SCALE 1" = 2000'	
CWB			DATE APRIL 1981	SHEET D-2

INTERNATIONAL ENGINEERING COMPANY, INC.

Project NATIONAL DAM INSPECTION PROGRAM Contract No. 2616-01

Feature CHASMARS POND DAM Designed RZ

Item Checked

Sheet D-2

File No.

Date 2/4/81

Date

HYDRAULIC/HYDROLOGIC INSPECTION

CHASMARS POND DAM, CT 00059, ROWAYTON, CONN.

DRAINAGE AREA

THE FIVEMILE RIVER WATERSHED IS ROUGHLY 9.7 MILES LONG FROM OUTLET TO DIVIDE MEASURED ALONG A STRAIGHT LINE, WHERE THE OUTLET IS TAKEN AT THE CONRAIL TRACK EMBANKMENT JUST SOUTH OF THE DAM. THE BASIN INCLUDES MOST OF DOWNTOWN NEW CANAAN AND A PORTION OF DOWNTOWN NORWALK. THE MAIN STEM IN FLOWING SOUTH PASSES UNDER ROADS AT LEAST TWENTY TIMES, INCLUDING ROUTE 123, THE MERRITT PARKWAY, THE BOSTON POST ROAD, CONNECTICUT TURNPIKE, AND KINGS HIGHWAY. THE TOTAL WATERSHED AREA IS 12.21 SQ. MI. AND APART FROM THE URBAN AREAS MENTIONED IS CHARACTERIZED AS PRIMARILY RESIDENTIAL AND COMMERCIAL. FLOW PROCEEDS IN A SOUTHEASTERLY DIRECTION INTO LONG ISLAND SOUND.

BECAUSE OF THE WATERSHED SHAPE AND MANY CONSTRICTIONS ENCOUNTERED AT ROAD CROSSINGS (SEE SHEET D-1) THE INFLOW HYDROGRAPH AT CHASMARS POND INLET WOULD HAVE SEVERAL PEAKS. THE LAGGING EFFECT PRODUCED AT THESE CONSTRICTIONS FORMING DETENTION STORAGE WOULD BE CONSIDERABLE. A DETAILED ANALYSIS AND HYDROLOGIC ROUTING OF THE BASIN IS BEYOND THE SCOPE OF THE PHASE I INSPECTION REPORT.

INTERNATIONAL ENGINEERING COMPANY, INC.

Project NDIP
Feature CHASMARS POND DAM
Item

Sheet D-3
Contract No. 2616-01
File No.
Designed RZ
Date 2/4/81
Checked
Date

A PHASE II STUDY WOULD BE REQUIRED TO ASCERTAIN THE CRITICAL DISCHARGE AT CHASMARS POND DAM. THIS DISCHARGE IS NOT EXPECTED TO BE ON THE ORDER OF A ½ PMF HOWEVER, BECAUSE FOR LOWER FREQUENCY FLOODS, THE CONTROL PASSES FROM THE SPILLWAY AT CHASMARS POND DAM TO THE RAILROAD EMBANKMENT AND APPURTENENT MASONRY ARCH CULVERT. IN SUCH AN EVENT THE RAILROAD EMBANKMENT IMPOUNDMENT WOULD SUBMERGE THE DAM ENTIRELY. FOR PURPOSES OF COMPUTATIONS, A DRAINAGE AREA OF 5.58 sq.mi. WAS ASSUMED CONSERVATIVELY AS CONTRIBUTING THE MAJOR PEAK OF THE INFLOW HYDROGRAPH. THIS SUBWATERSHED INCLUDES ALL DRAINAGE AREA SOUTH OF THE MERRITT PARKWAY. THE VOLUME UNDER THE INFLOW HYDROGRAPH WITH THE PEAK GIVEN BY THE ABOVE APPROACH IS THAT OF THE ENTIRE WATERSHED.

I. PERFORMANCE AT TEST FLOOD CONDITIONS

1. PROBABLE MAXIMUM FLOOD

a. WATERSHED CLASSIFIED AS "ROLLING"

b. WATERSHED AREA (D.A.) = 5.58* SQ. MI.

* D.A. FROM IECO MEASUREMENTS ON U.S.G.S. NORWALK SOUTH, CT QUADRANGLE MAP (SEE PP. D-1 AND D-2).

c. EXTRAPOLATING FROM NED-ACE GUIDE CURVES

$PMF \approx 1825$ CFS/SQ. MI.

D. THEREFORE, PEAK INFLOW:

$PMF = 1825 \times 5.58 \approx 10200$ CFS

$\frac{1}{2}$ PMF = 5100 CFS

2. SURCHARGE AT PEAK INFLOWS (PMF AND 1/2 PMF)

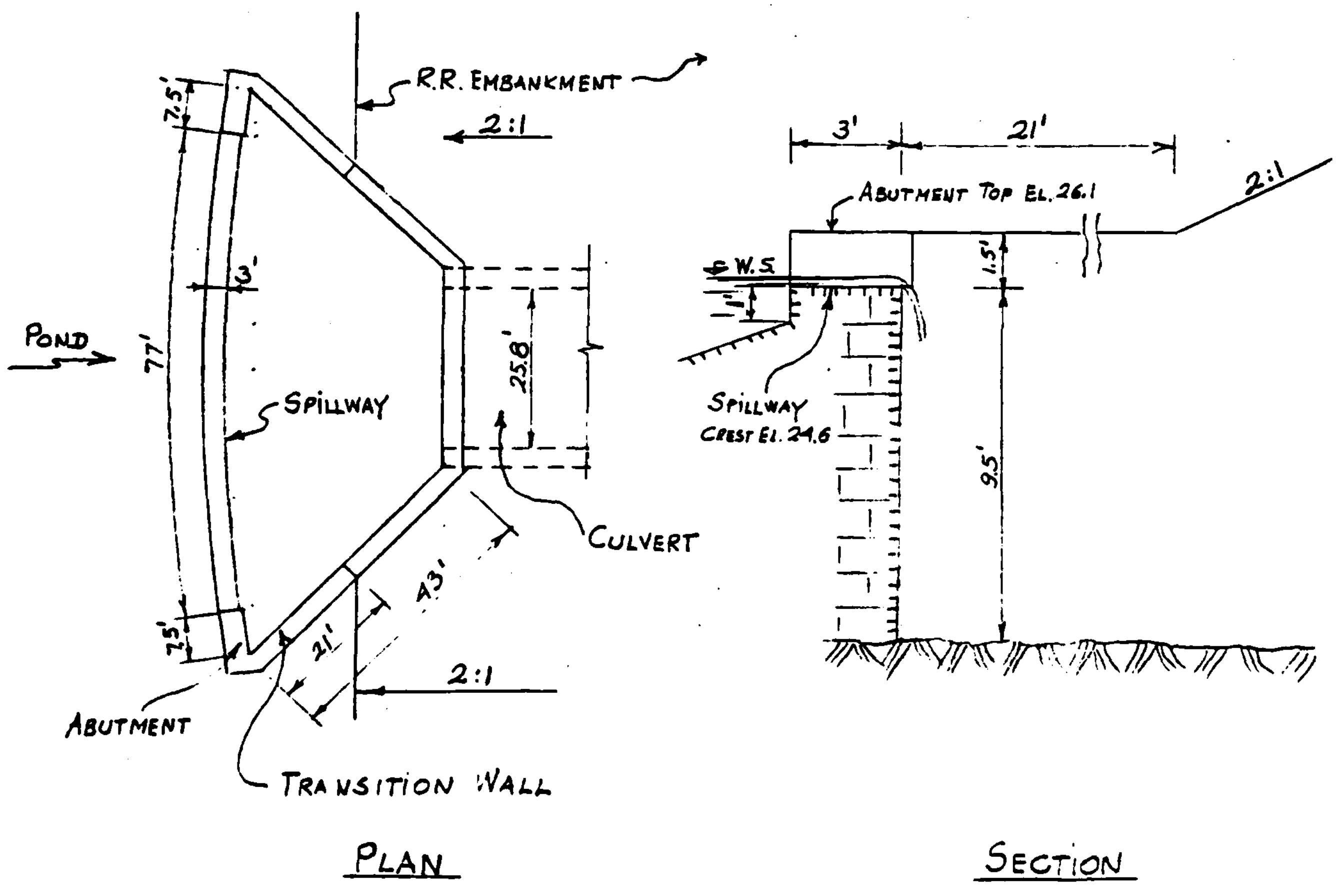
a. OUTFLOW RATING CURVE

CHASMARS POND DAM HAS A 3-FT.-WIDE, 77-FT.-LONG BROAD-CRESTED MASONRY SPILLWAY WHICH IS CURVED IN PLAN (SEE SKETCH BELOW). THE ABUTMENTS ARE 7.5 FEET LONG AND EXTEND 1.5 FEET ABOVE THE SPILLWAY

INTERNATIONAL ENGINEERING COMPANY, INC.

Project	NDIP	Contract No. 2616-01	Sheet D-5
Feature	CHASMARS POND DAM	Designed MP	File No.
Item		Checked	Date 1/21/81
			Date

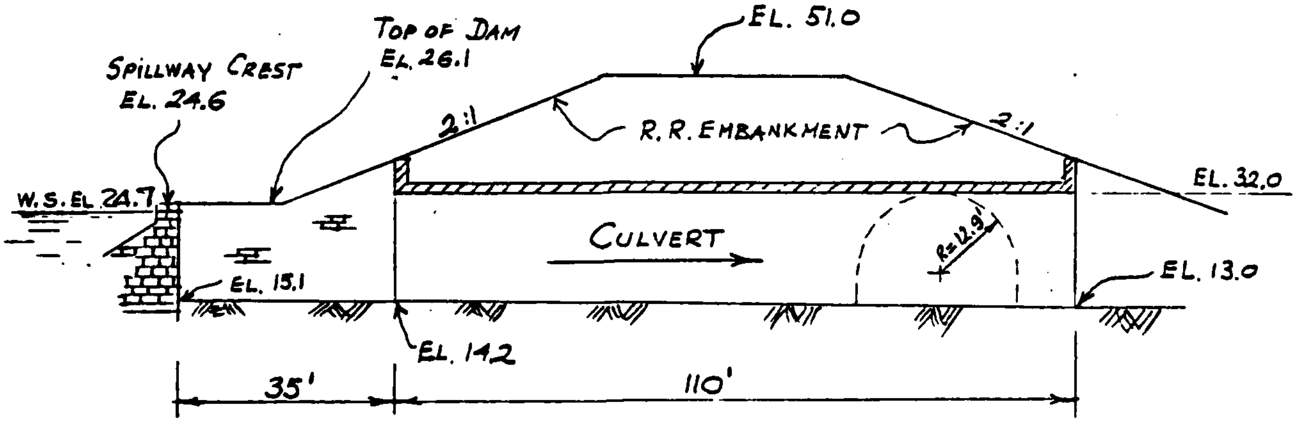
CREST (EL 24.6) - Two 43-FT-LONG MASONRY WALLS EXTEND FROM THE DAM ABUTMENTS TO A 25.8-FEET WIDE HORSESHOE-SHAPED MASONRY BRICK LINED RAILROAD CULVERT LOCATED 35 FT. DOWNSTREAM. THE TOP OF THE 21-FT-LONG HORIZONTAL SECTIONS OF THE WALLS ADJACENT TO THE DAM HAVE THE SAME ELEVATION AS THE TOP OF THE DAM ABUTMENTS. THE SLOPE OF THE RAILROAD EMBANKMENT ADJOINING THE TRANSITION WALLS HAS AN INCLINATION OF 2H TO 1V (Z=2).



INTERNATIONAL ENGINEERING COMPANY, INC.

Project NDIP	Contract No. 2616-01	Sheet D-6	
Feature CHASMARS POND DAM	Designed MP, RZ	File No.	Date 1/21/81
Item	Checked BJ	Date	

THE TOP OF THE RAILROAD EMBANKMENT (EL 51.0 NGVD) is 26.4 FT ABOVE THE SPILLWAY CREST AND 24.9 FT ABOVE THE TOP OF THE DAM. THE LARGE CULVERT WITHIN THE RR EMBANKMENT is 110 feet long AND THE CULVERT INVERT ELEVATION VARIES FROM 14.2 AT THE ENTRANCE TO 13.0 AT THE EXIT. THE GENERAL SCHEME OF THE PROJECT IS SHOWN ON THE SKETCH BELOW:



THE DEVELOPMENT OF THE OUTFLOW RATING CURVE WAS A FOUR STEP PROCESS.

THE FIRST STEP, DEVELOPING A FREE DISCHARGE RATING CURVE, INVOLVED ESTIMATING WEIR COEFFICIENTS AND THE ASSESSMENT OF HYDRAULIC INEFFICIENCIES ARISING FROM IRREGULARITIES OF THE DAM SPILLWAY PLAN (SEE SKETCH ON P. 4).

INTERNATIONAL ENGINEERING COMPANY, INC.

Project NDIP	Contract No. 2616-01	Sheet D-7	File No.
Feature CHASMARS POND DAM	Designed RZ	Date 1/21/81	
Item	Checked	Date	

THE SECOND STEP REQUIRED COMPUTING THE MAXIMUM TAILWATER AT THE CULVERT OUTLET IN ORDER TO ASCERTAIN THE TAILWATER EFFECT AT THE OUTLET. A CONSERVATIVE DISCHARGE OF 9500 CFS (THE PMF = 10,200 CFS) WAS USED TO ESTABLISH A MAXIMUM ELEVATION TO DETERMINE WHETHER THE CULVERT WOULD FLOW FULL AT AND PERHAPS BELOW THE PMF. IT WAS CONCLUDED, BASED UPON THE RESULTS, THAT THE CULVERT WILL FLOW PART FULL FOR ALL DISCHARGES.

THE THIRD STEP REQUIRED THE DEVELOPMENT OF A RATING CURVE OF THE HEAD AT THE CULVERT INLET. THE DEVELOPMENT OF THE CURVE WAS BASED ON AN APPROXIMATION THAT NET ENERGY HEAD ON THE CULVERT WAS EQUIVALENT TO 1.5 VELOCITY HEADS, BASED ON THE AVERAGE VELOCITY COMPUTED IN THE CULVERT.

THE FORTH STEP WAS THE COMBINING OF THE CURVES PRODUCED IN STEP ONE AND THREE WHICH REQUIRED THE ADJUSTMENT OF THE FREE DISCHARGE RATING CURVE IN STEP ONE BY TAKING SUBMERGED WEIR FLOW INTO CONSIDERATION (SEE BRATER AND KING, 1966, p. 5-18).

INTERNATIONAL ENGINEERING COMPANY, INC.

Project NDIP | Contract No. 2616-01 | Sheet D-8 | File No.
Feature CHASMARS POND DAM | Designed MP | Date 1/21/81
Item | Checked | Date

(1) FREE DISCHARGE

ASSUMING THE SPILLWAY DISCHARGE COEFFICIENT $C \approx 3.3$

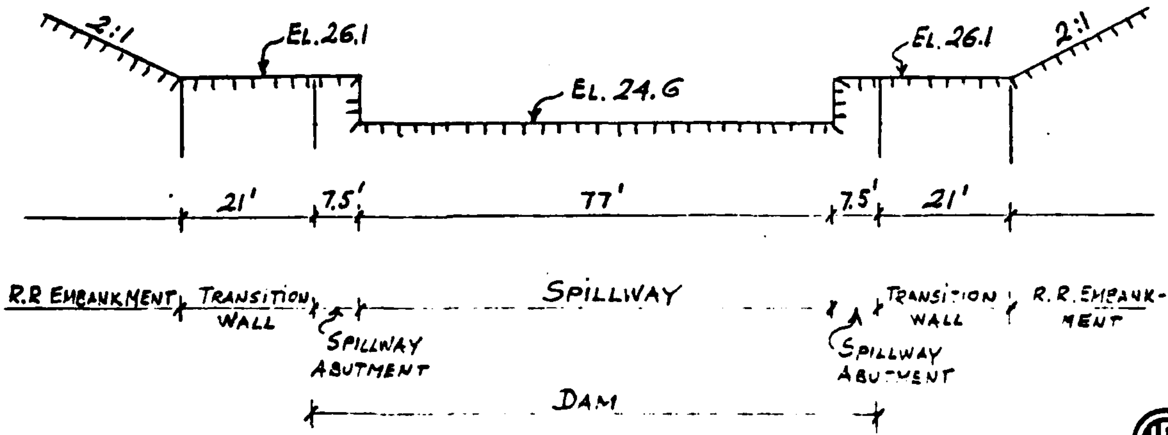
(SEE BRATER AND KING, p. 5-44) AND USING THE SPILLWAY CREST EL. 24.6

AS DATUM, THE SPILLWAY DISCHARGE IS APPROXIMATED BY:

$$Q_s = CLH^{3/2} = 3.3 \times 77\,H^{3/2} = 254.1\,H^{3/2}$$

A.) EXTENTION OF THE RATING CURVE FOR SURCHARGE OVERTOPPING THE DAM AND/OR ADJACENT TERRAIN

THE CHASMARS POND DAM IS A MASONRY STRUCTURE WITH A TOP ELEVATION OF 26.1 AND TOTAL LENGTH OF 92± FT WHICH INCLUDES THE 77-FT-LONG SPILLWAY SECTION. THE 21-FT-LONG SECTION OF THE MASONRY TRASITION WALLS (TOP EL 26.1) AND THE ADJACENT 2:1 SLOPES OF THE RR EMBANKMENT WERE INCORPORATED IN THE VERTICAL PROJECTION OF THE DAM PROFILE (SEE SKETCH BELOW AND SKETCHES ON P.P. D-4 AND D-5).



DUE TO THE IRREGULARITIES IN PLAN , AN EQUIVALENT WEIR LENGTH MUST BE COMPUTED. ASSUMING A DISCHARGE COEFFICIENT C=2.7 FOR THE TOP OF THE DAM AND TRANSITION WALLS AND FOR THE SLOPE OF THE R.R. EMBANKMENT AND ADOPTING THE SPILLWAY CREST AS DATUM (EL. 24.6), THE OVERFLOW CAN BE APPROXIMATED BY THE FOLLOWING EQUATIONS:

TOP OF DAM AND TRANSITION WALLS AT ELEV. 26.1:

$$Q_{DT} = 2.7 \times 57 \times (H-1.5)^{3/2} = 153.9(H-1.5)^{3/2}$$

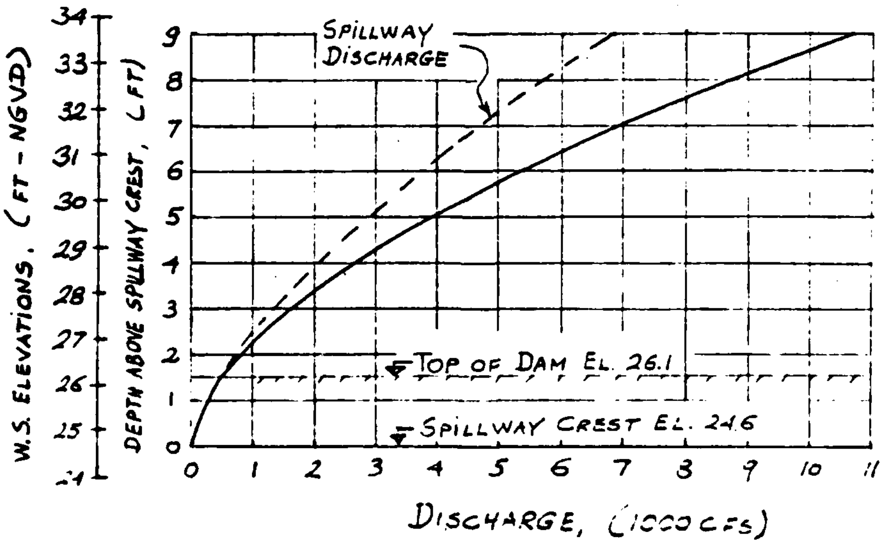
SLOPE OF R.R. EMBANKMENT TO THE RIGHT AND LEFT OF THE DAM:

$$L_e = 2 \times 2/5 \times 2\,(H-1.5) = 1.6\,(H-1.5) \therefore Q_{RR} = 2.7 \times 1.6\,(H-1.5)^{3/2} = 4.32\,(H-1.5)^{5/2}$$

THEREFORE, THE TOTAL OUTFLOW RATING CURVE IS APPROXIMATED BY:

$$Q_T = Q_S + Q_{DT} + Q_{RR} = 254.1\,H^{3/2} + 153.9(H-1.5)^{3/2} + 4.32(H-1.5)^{5/2}$$

THE RESULTING FREE OUTFLOW RATING CURVE IS SHOWN BELOW:

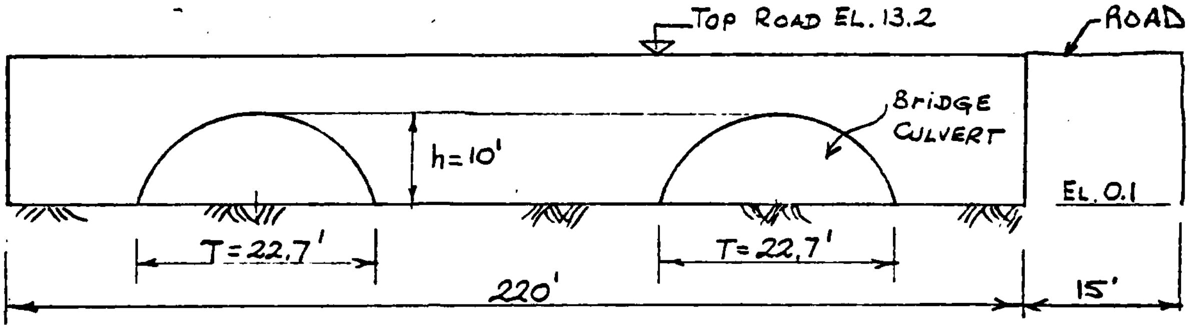


INTERNATIONAL ENGINEERING COMPANY, INC.

Project: NDIP	Contract No. 2616-01	Sheet: D-10	
Feature: CHASMARS POND DAM	Designed: YB, RZ	File No.	
Item	Checked	Date: 1/21/81	
		Date	

(2) CULVERT OUTLET: MAXIMUM TAILWATER

JACOB STREET BRIDGE LOCATED 1750 FT DOWNSTREAM FROM THE R.R. CULVERT IS A CONTROL OF THE STREAM. THIS BRIDGE IS A MASONRY STRUCTURE WITH TWO ARCH CULVERTS (SEE SKETCH BELOW):



i. DISCHARGE THROUGH BRIDGE CULVERTS:

AREA OF CULVERT: $A = 2/3\,hT = 2/3 \times 10 \times 22.7 = 151.3$ SQ. FT.

WETTED PERIMETER: $P = 2T + \frac{8h^2}{3T} = 2(22.7) + \frac{8 \times 10^2}{3 \times 22.7} = 54.3$ FT

HYDRAULIC RADIUS: $R = A/P = 151.3/54.3 = 2.79$ FT

$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$; ASSUME: $n = 0.03$ AND $S = 0.002$ (ASSUMED ENERGY GRADE)

$\therefore\ Q = \frac{1.486}{0.03}\, 151.3 \times 2.79^{2/3} \times 0.002^{1/2} = 667$ CFS

DISCHARGE THROUGH TWO CULVERTS: $Q = 2 \times 667 = 1330$ CFS

ii. FLOW OVER BRIDGE:

ASSUME: FLOW IN STREAM IS 9500 CFS (ROUGHLY THE PMF= 10200 CFS)

AND COEFFICIENT OF DISCHARGE OVER THE BRIDGE $C = 2.3$

FLOW OVER THE BRIDGE. $Q = 9500 - 1330 = 8170$ CFS

HEAD OF WATER ON THE BRIDGE : $H = \left(\frac{Q}{CL}\right)^{2/3} = \left(\frac{8170}{2.8 \times 235}\right)^{2/3} = 5.4$ FT

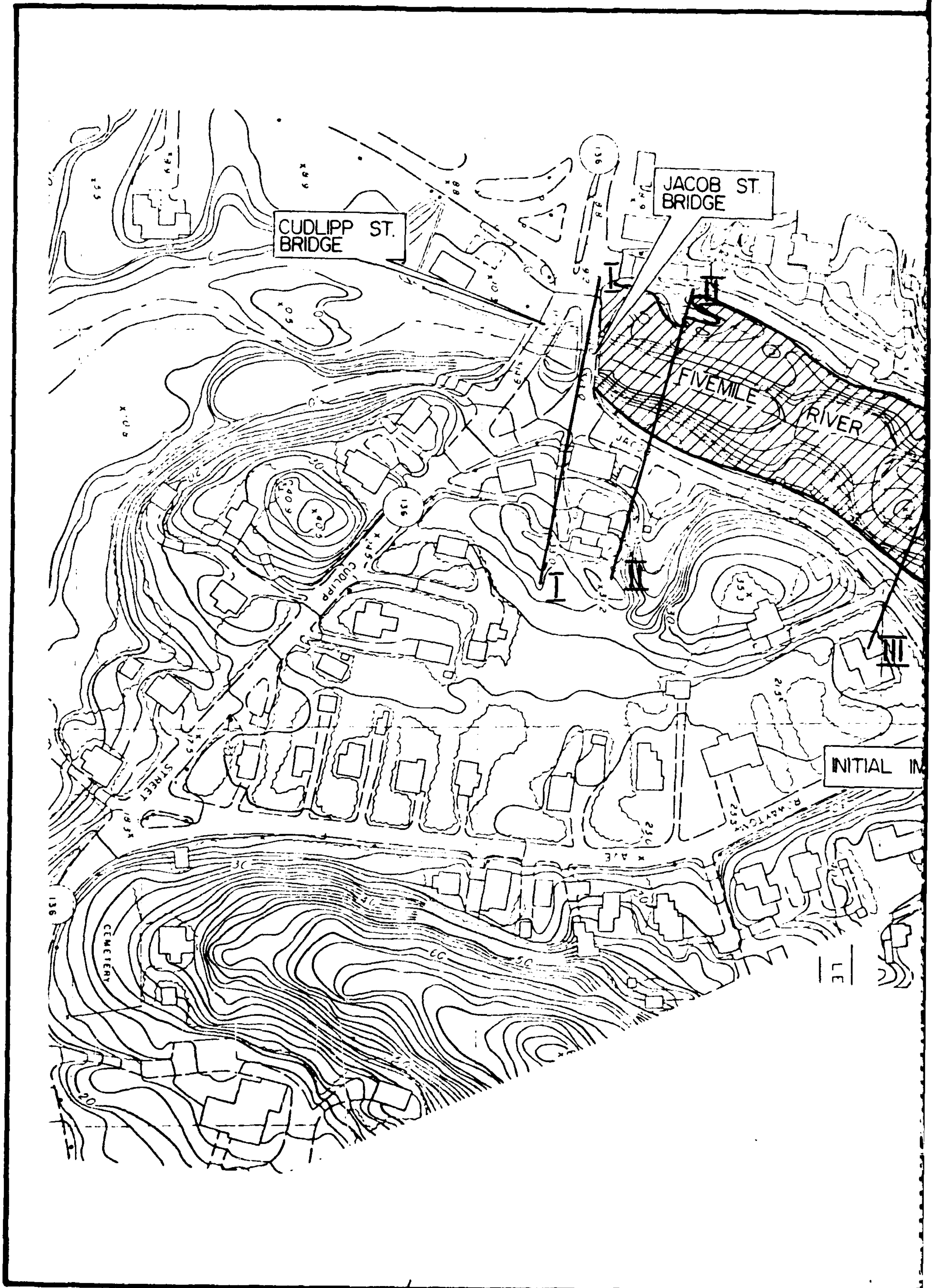
ASSUMING THE CREST OF THE WEIR ELEVATION IS 13.2 NGVD THE W.S. ELEVATION BEFORE THE BRIDGE IS $13.2 + 5.4 = 18.6$ NGVD.

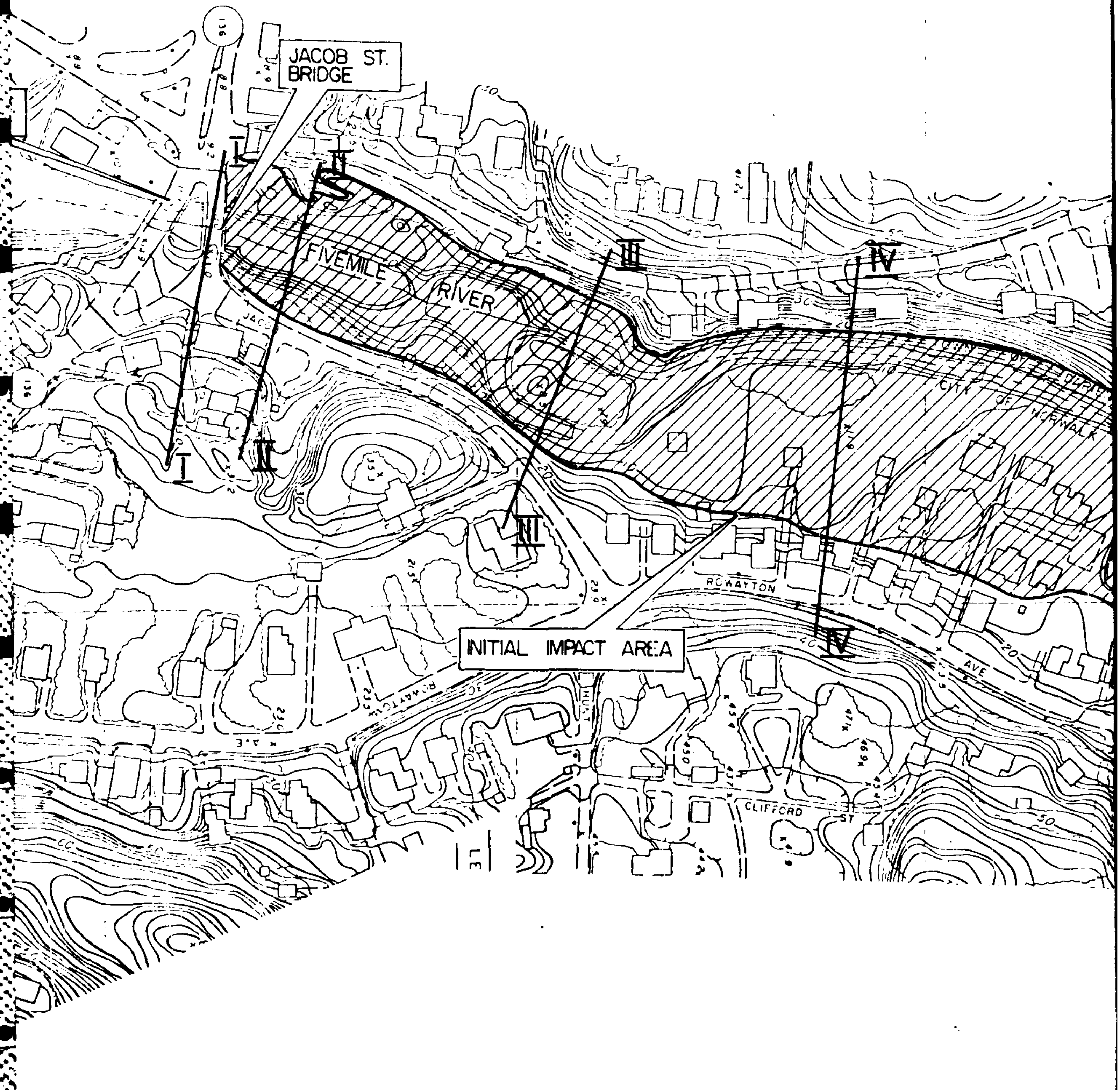
III. MAXIMUM TAILWATER PROFILE

STANDARD STEP METHOD (SEE CHOW "OPEN CHANNEL HYDRAULICS") WAS USED TO ESTABLISH A MAXIMUM TAILWATER PROFILE OF FIVEMILE RIVER BETWEEN THE R.R. EMBANKMENT AND JAKOB STREET BRIDGE.

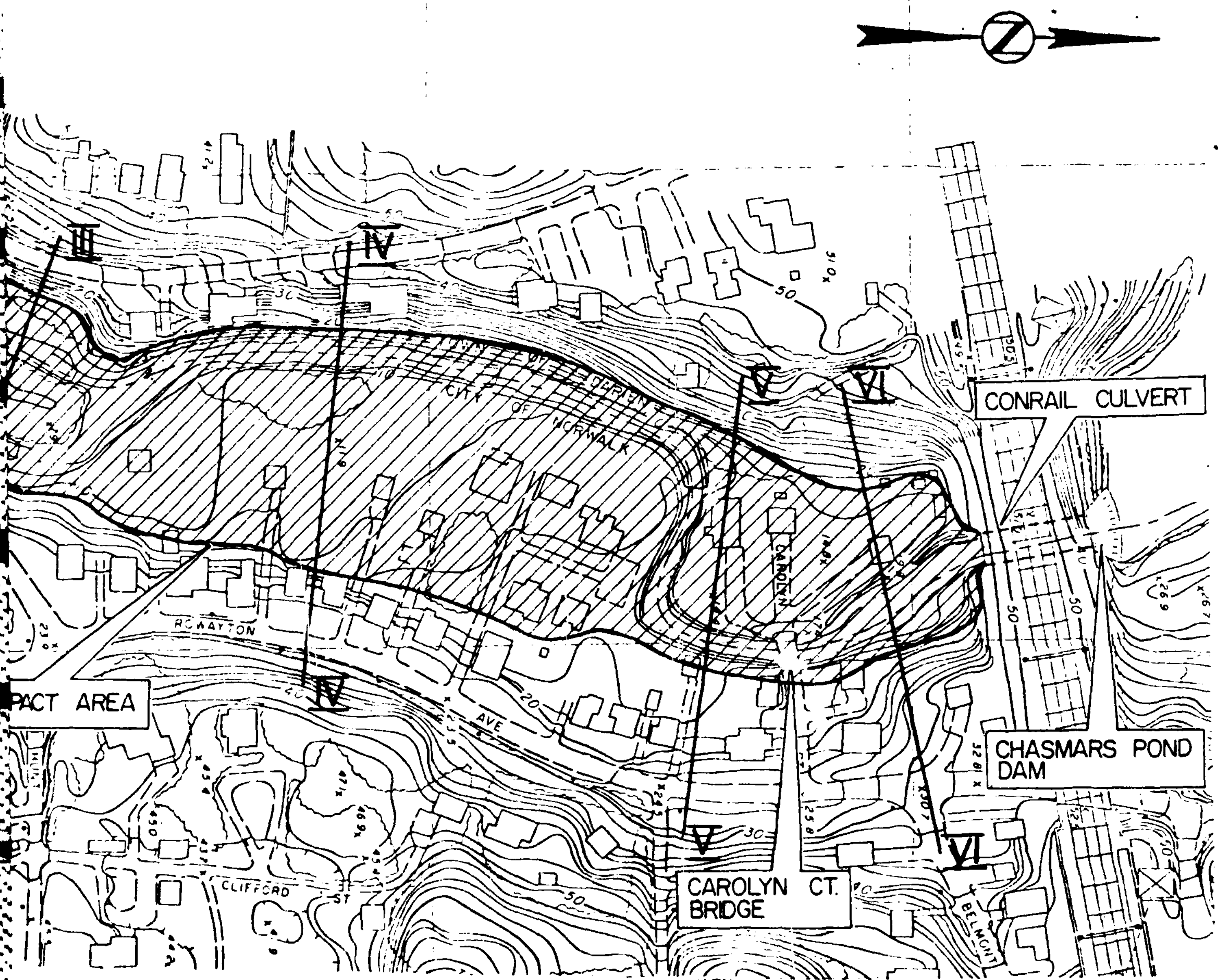
A TOPOGRAPHICAL MAP OF THE INITIAL IMPACT AREA OF THE TOWN OF NORWALK WAS EMPLOYED TO DETERMINE THE SIX RIVER CROSS-SECTIONS (SEE THE MAP ON P. D-12). THE RESULTS OF THE COMPUTATIONS IS SUMMARIZED IN A TABLE ON P. D-13 AND ON A FIGURE SHOWN ON P. D-14.

AS IT CAN BE SEEN FROM THESE RESULTS, THE MAXIMUM TAILWATER ELEVATION ON THE RR. CULVERT OUTLET DURING THE RIVER MAXIMUM FLOW (~ THE PMF) IS 22.9 NGVD WHICH IS 9.1 FT BELOW THE CULVERT CROWN (EL. 32.0 NGVD). CONSEQUENTLY, IT WAS CONCLUDED THAT THE CULVERT WILL FLOW PART FULL FOR ALL DISCHARGES.


CUDLIPP ST.
BRIDGE
JACOB ST.
BRIDGE
FIVEMILE
RIVER
CUDLIPP
STREET
CEMETERY
INITIAL IM



JACOB ST.
BRIDGE
FIVEMILE
RIVER
INITIAL IMPACT AREA
ROWAYTON
AVE
CLIFFORD
ST
CITY OF NORWALK
I
II
III
IV



INTERNATIONAL ENGINEERING CO DARIEN, CONNECTICUT ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

TOPOGRAPHICAL MAP (APRIL 1978)

NORWALK, CONNECTICUT

DWN BY	CKD BY	APP BY	SCALE NOT TO SCALE	
[illegible]	B	[illegible]	DATE MARCH 1981	SHEET D-12

INTERNATIONAL ENGINEERING COMPANY, INC.

Project: NDIP
Feature: CHASMARS POND DAM
Item:

Sheet: D-13
Contract No. 2616-01
File No.
Designed: YB RZ
Date: 1/21/81
Checked: [illegible]
Date:

TABULATION OF STANDARD STEP METHOD COMPUTATIONS

SECTION No.	SUBSECTION	Z (FT)	A (FT²)	P (FT)	R (FT)	n	$\frac{K}{10^3}$	$\frac{K^3}{A^2}/10^8$	α	V (FT/SEC)	$\frac{\alpha V^2}{2g}$	H	S_f	$\bar{S}_f$	ΔX (FT)	h_f	H
I-I	MC		2460	185	13.2	0.05	409.45	113									
	LO	18.5	120	48	2.5	0.08	4.12	0	1.29	3.05	0.16	18.66	0.0004				18.66
	RO		520	122	4.26	0.08	25.45	0.6									
	TOTAL		3100				439.02	113.6									
II-II	MC		2680	231	11.3	0.05	402.16	90									
	LO	18.6	240	74	3.2	0.08	9.71	0.16	1.14	3.17	0.17	18.77	0.0005	0.00045	130	0.058	18.72 ≑ 18.77 ok
	RO		80	45	1.8	0.08	2.20	0.02									
	TOTAL		3000				414.07	90.18									
III-III	MC	18.8	2300	203	11.3	0.05	345.14	77.7	1.00	4.10	0.28	19.08	0.0008	0.0006	340	0.204	18.92 ≑ 19.08 ok
IV-IV	MC		1690	261	6.5	0.05	175.41	18.8									
	LO	19.2	120	34	3.5	0.08	5.15	0.09	1.00	5.13	0.44	19.64	0.0027	0.0017	370	0.62	19.71 ≑ 19.64 ok
	RO		40	21	1.9	0.08	1.14	0									
	TOTAL		1850				187.10	18.89									
V-V	MC		1580	260	6.0	0.05	153.50	14.4									
	LO	20.8	240	82	2.9	0.08	9.09	0.1	1.17	4.75	0.35	21.15	0.003	0.0028	600	1.68	21.39 ≑ 21.15 ok
	RO		180	41	4.3	0.08	8.87	0.2									
	TOTAL		2000				171.46	14.7									
VI-VI	MC	21.2	1100	241	4.6	0.05	90.67	6.15	1.0	9.00	1.38	22.58	0.010	0.006	250	1.50	22.89 ≑ 22.58 ok

INTERNATIONAL ENGINEERING COMPANY, INC.

Sheet D-K

Project NJ.D

Contract No. 2616

File No.

Feature CHESHIRES POND DAM

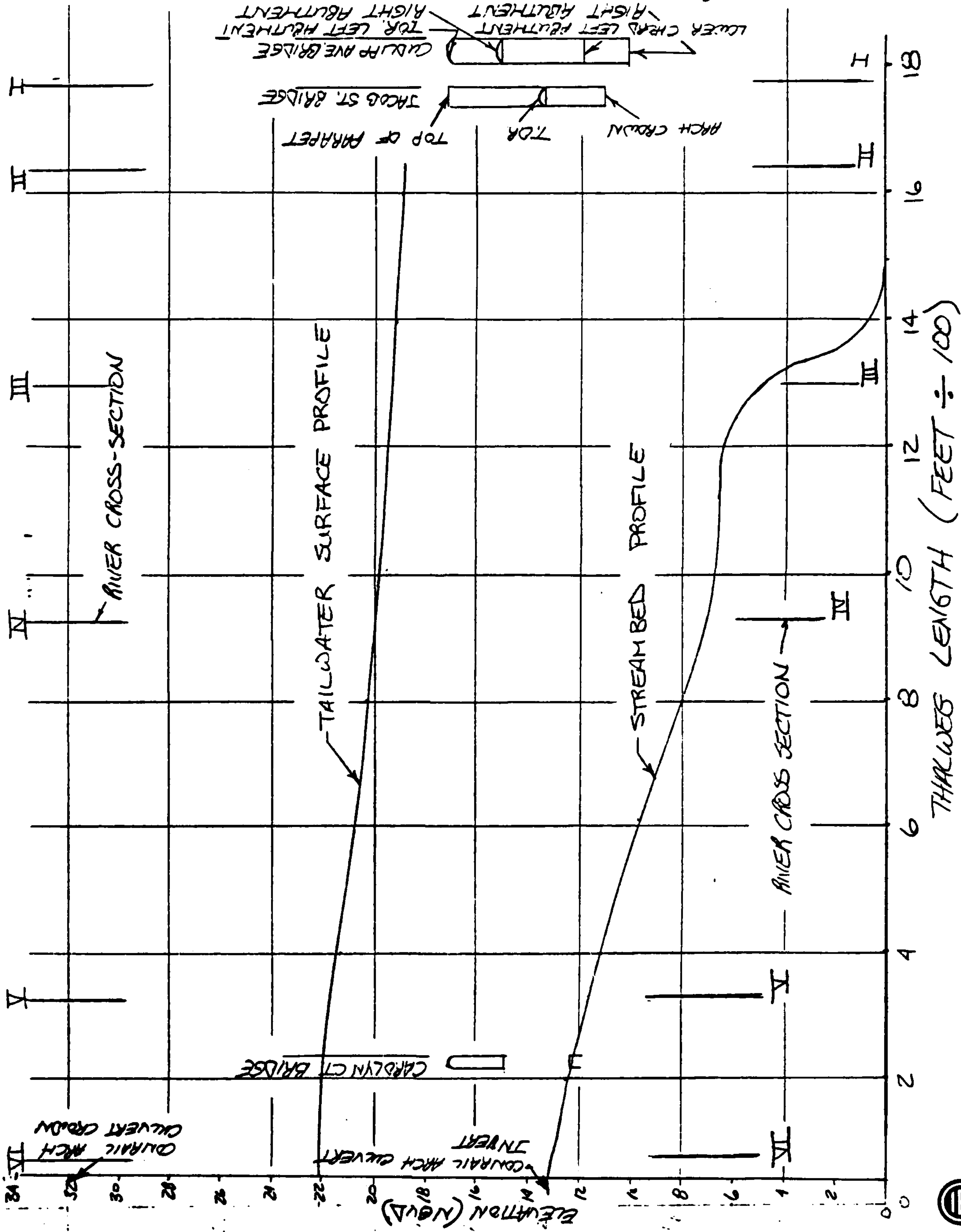
Designed

Date 11/11/81

Item

Checked

Date



INTERNATIONAL ENGINEERING COMPANY, INC.

Project NDIP
Feature CHASMARS POND DAM
Item

Sheet D-15
Contract No. 2616-01
File No.
Designed YB, RZ
Date 1/21/81
Checked
Date

(3) CULVERT STAGE-DISCHARGE RATING CURVE

A FLOW RATING CURVE INSIDE OF THE R.R. CULVERT WAS COMPUTED USING MANNING FORMULA: $Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$. ASSUMING THE HEIGHT OF THE CULVERT IS 19 FT, $n = 0.02$ AND $S = 0.009$, THE DISCHARGES WERE ESTIMATED FOR VARIOUS DEPTHS OF WATER IN THE CULVERT (SEE TABULATION BELOW):

DEPTH, Y (FT)	A (SQ. FT)	P (FT)	R (FT)	Q (CFS)
2	51.6	29.8	1.73	525
6	155	37.8	4.10	2806
10	253.8	45.8	5.54	5616
14	340.6	54.8	6.22	8142

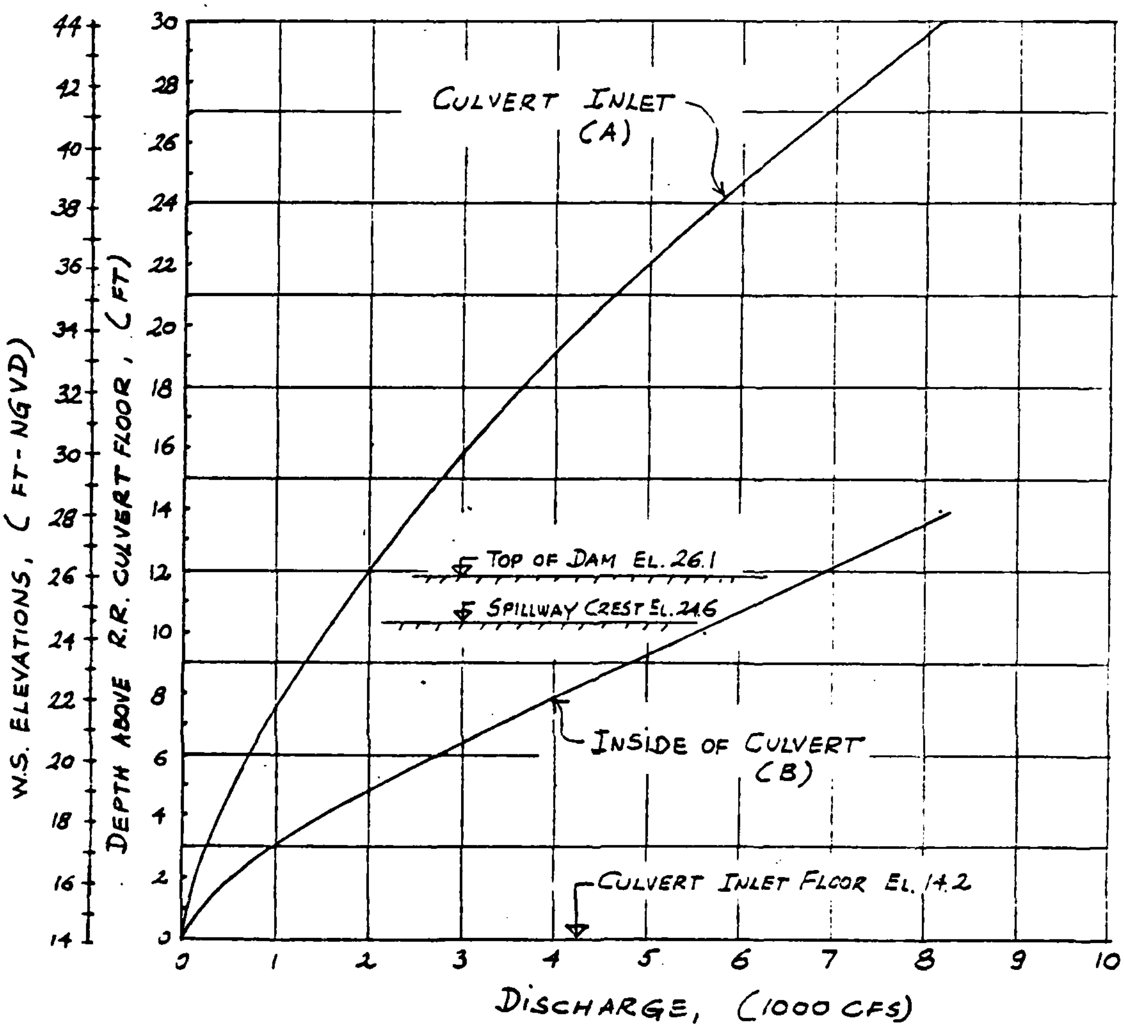
THE HEAD ON THE R.R. CULVERT INLET WAS COMPUTED USING AN EQUATION: $H = \frac{\alpha V^2}{2g}(1 + K_e) + Y_B$, WHERE: $\alpha = 1.2$; $K_e = 0.5$; AND Y_B = DEPTH OF WATER IN THE CULVERT. THE RESULTS OF THE COMPUTATIONS ARE SHOWN IN A TABLE BELOW:

Y_B (FT)	Q (CFS)	A (SQ. FT)	V (FPS)	H (FT)
2	525	51.6	10.17	4.89
6	2806	155	18.1	15.15
10	5616	253.8	22.12	23.67
14	8142	340.6	23.90	29.97

THE STAGE-DISCHARGE CURVES INSIDE AND ON THE CULVERT INLET ARE PRESENTED ON P. D-16

INTERNATIONAL ENGINEERING COMPANY, INC.

Project NDIP Contract No. 2616-01 Sheet D-16
Feature CHASMARS POND DAM Designed VB, RZ File No.
Item Checked Date 1/21/81
Date



THE OUTFLOW RATING CURVE FOR SUBMERGED CONDITION WAS COMPUTED USING EQUATION : $\frac{Q}{Q_1} = \left[1 - \left(\frac{H_2}{H_1}\right)^n\right]^{0.385}$ (BRATER & KING, p. 5-19), WHERE: H_1 AND H_2 = HEADS ON UPSTREAM AND DOWNSTREAM SIDES OF WEIR, RESPECTIVELY; Q AND Q_1 = DISCHARGES FOR SUBMERGED AND FREE CONDITION, RESPECTIVELY; $n = 1.5$ IN THE DISCHARGE EQUATION.

THE TABULATION OF THESE COMPUTATIONS IS PRESENTED BELOW:

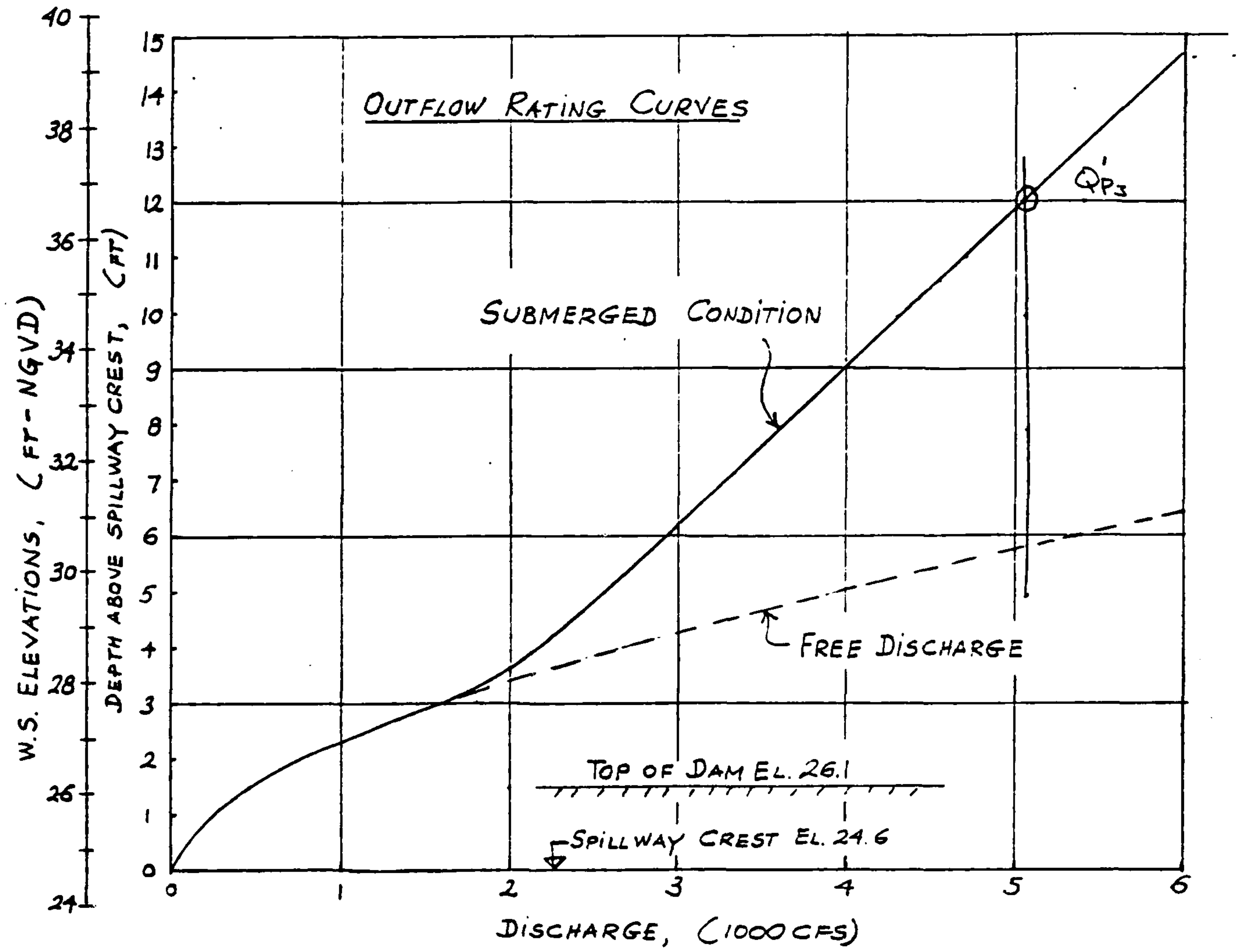
CULVERT DISCHARGE (CFS)	H_2 (FT)	(H_1) (FT)	Q_1 (CFS)	Q (CFS)
1800	1.0	3.32	1934	1804
2000	1.6	3.65	2286	2004
3000	5.4	6.21	5713	3009
4000	8.7	9.15	10988	4008
5000	11.6	11.93	17172	5030
6000	14.3	14.57	24071	6049

(4) DAM OUTFLOW RATING CURVE

THE DAM OUTFLOW RATING CURVE IS THE COMBINATION OF THE FREE DISCHARGE CURVE (STEP 1, p. D-9) AND THE SUBMERGED WEIR FLOW (STEP 3, TABLE ON P. D-17).

THE ADJUSTING FREE DISCHARGE RATING CURVE IS SHOWN ON P. D-18.

b. SURCHARGE HEIGHT TO PASS 1/2 PMF INFLOW (Q'_{P_1}).



@ $Q_1' = 5100$ CFS $\quad H_1' = 12.2$ FT

C. EFFECT OF SURCHARGE STORAGE ON 1/2 PMF PEAK OUTFLOW.

i. AVERAGE POND AREA WITHIN EXPECTED SURCHARGE:

INTERNATIONAL ENGINEERING COMPANY, INC.

Project NDIP — Contract No. 2616 — Sheet D-19 — File No.
Feature CHASMARS POND DAM — Designed MP — Date 1/21/81
Item — Checked [illegible] — Date

(1) POND AREA AT FLOW LINE (EL 24.6) $A_{24.6} = 26.5^{*}$ ac

(2) AREA AT EL 30 CONTOUR $A_{30} = 46^{*}$ ac

(3) AREA AT EL 40 CONTOUR $A_{40} = 150^{*}$ ac

NOTE: * FROM USGS NORWALK SOUTH QUADRANGLE MAP, CT.

ii. ASSUME NORMAL POOL AT SPILLWAY CREST EL 24.6

iii. DISCHARGE (Q_{P_2}) AT VARIOUS HYPOTHETICAL SURCHARGES

H = 12 FT $.245''(5.58)\left(\frac{640}{12}\right) = 73$ $S = \frac{V}{53.3(5.58)} = .245''$

H = 10 FT $= 57$ $S = .192$

H = 8 FT 46 $S = .155$

H = 5 FT 30 $S = .101$

FROM NED-ACE APPROXIMATE ROUTING GUIDELINES:

$$Q'_{P_2} = Q'_{P_1}\left(1 - \frac{S}{9.5(2.19)}\right)$$

H = 12 FT $Q'_{P_2} = 5040$ CFS

H = 10 FT $Q'_{P_2} = 5053$ CFS

H = 8 FT $Q'_{P_2} = 5062$ CFS

H = 5 FT $Q_{P_2} = 5075$ CFS

NOTE: THE RUNOFF IS MULTIPLIED BY 2.19 TO ACCOUNT FOR THE RUNOFF FROM THE ENTIRE D.A. (ie. 12.21 / 5.58 = 2.19)

d. PEAK OUTFLOW (Q'_{P_3})

USING NED-ACE GUIDELINES "SURCHARGE STORAGE ROUTING" ALTERNATE METHOD AND THE OUTFLOW RATING CURVE (D-18)

$Q'_{P_3} = 5040$ CFS. $H'_3 = 12.0$ FT

INTERNATIONAL ENGINEERING COMPANY, INC.

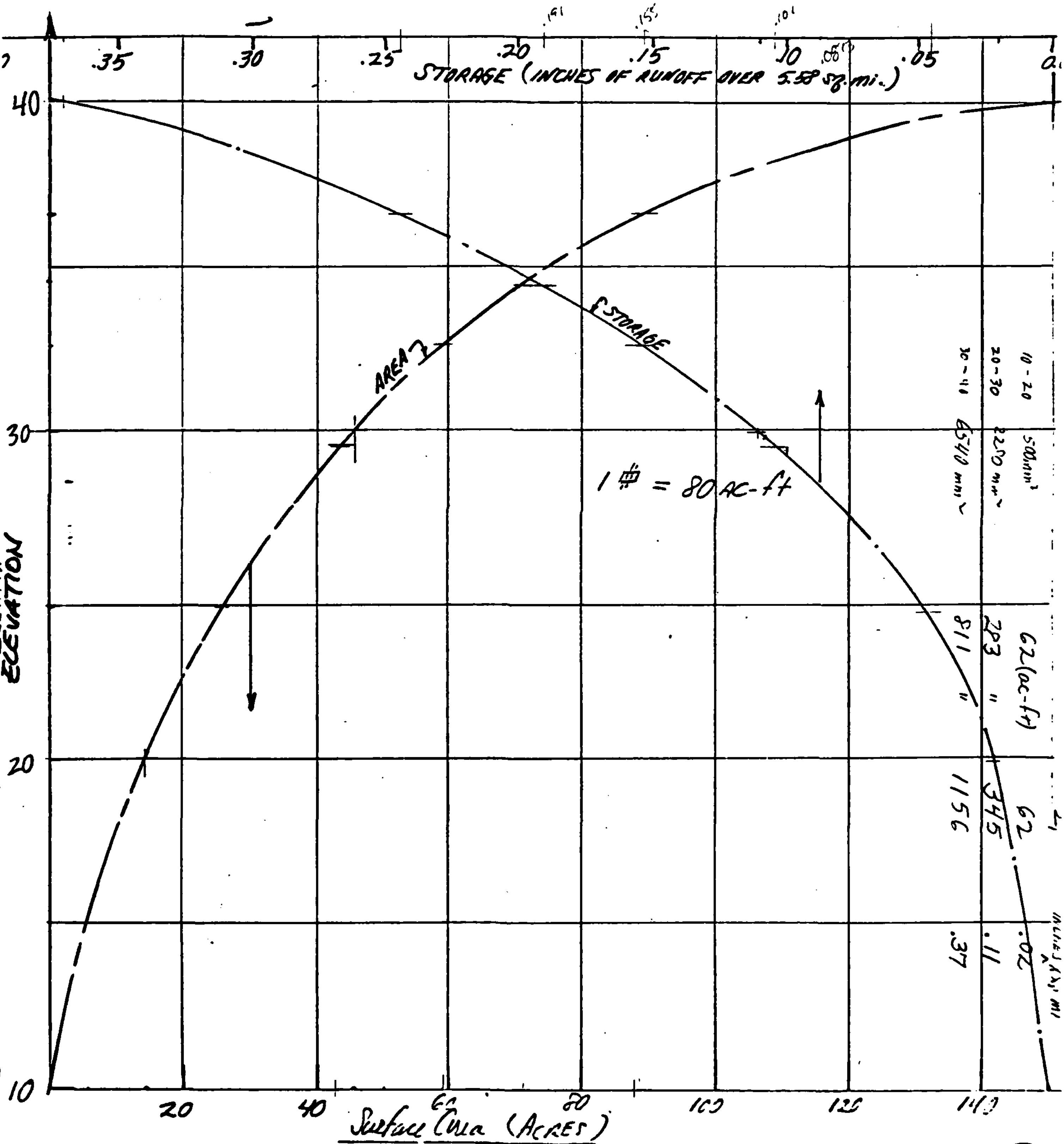
Sheet D-20

Project NDIP
Feature CHESMAPS POND DAM
Item

Contract No. 2616
Designed MP
Checked BJ

File No.
Date 1/21/81
Date

AREA-CAPACITY CURVE



INTERNATIONAL ENGINEERING COMPANY, INC.

Project NDIP
Feature CHASMARS POND DAM
Item

Contract No. 2616-01
Designed MP
Checked

Sheet D-21
File No.
Date 1/21/81
Date

3. SPILLWAY CAPACITY RATIO TO 1/2 PMF PEAK INFLOW AND OUTFLOW.

SPILLWAY CAPACITY TO TOP OF DAM (EL. 26.1 NGVD):

$H = 1.5\ M$; $Q = 467\ cfs$

∴ THE TOTAL SPILLWAY CAPACITY TO TOP OF DAM IS 9.2% OF THE INFLOW (Q'_{P_1}) AND 9.3% OF THE OUTFLOW (Q'_{P_3}) AT PEAK FLOOD = 1/2 PMF.

NOTE: THE CHASMARS POND DAM DOES NOT HAVE A LOW-LEVEL

TO LOWER THE RESERVOIR IN EMERGENCIES.

INTERNATIONAL ENGINEERING COMPANY, INC.

Project NDIP	Contract No. 2616-01	Sheet D-22
Feature CHASMARS POND DAM	Designed MP	File No.
Item	Checked	Date 1/23/81
		Date

II. DOWNSTREAM FAILURE HAZARD

1. POTENTIAL IMPACT AREA

A NUMBER OF HOUSES ARE LOCATED ALONG FIVEMILE RIVER IN THE SOUTHERN PORTION OF THE TOWNS OF NORWALK AND DARIEN, APPROXIMATELY 300 FT TO 1700 FT DOWNSTREAM OF THE DAM, WITHIN THE IMPACT AREA. THE FIRST FLOOR ELEVATIONS OF THESE HOMES RANGE FROM $5^{\pm}$ FT TO $7^{\pm}$ FT ABOVE THE STREAMBED. CONSEQUENTLY, THE STRUCTURES ARE CONSIDERED POTENTIAL DOWNSTREAM HAZARDS.

2. FAILURE AT CHASMARS POND DAM.

a. BREACH WIDTH

i. HEIGHT OF DAM

TOP OF DAM EL. 26.1; DAM DOWNSTREAM TOE EL. 15.1; $\therefore h = 11$ FT

ii. LENGTH OF DAM: $\ell = 92$ FT (FROM IECO DRAWINGS);

iii. BREACH WIDTH (SEE NED-ACE DOWNSTREAM FAILURE GUIDELINES):

$$W_b = 0.4\,\ell = 0.4 \times 92 \cong 37 \text{ FT}$$

b. PEAK FAILURE OUTFLOW (Q_F)

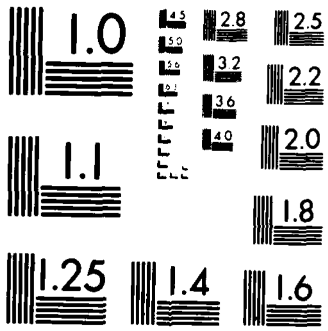
ASSUME SURCHARGE AT TOP OF DAM (EL. 26.1)

i. HEIGHT AT TIME OF FAILURE: $Y_o = 11$ FT.

AD-A142 709 CONNECTICUT COASTAL BASIN DARIEN - NORWALK CONNECTICUT 2/2
CHASMARS POND DAM (..(U) CORPS OF ENGINEERS WALTHAM MA
NEW ENGLAND DIV MAY 81

UNCLASSIFIED F/G 13/13 NL

END
FILMED
DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

INTERNATIONAL ENGINEERING COMPANY, INC.

Project NDIP | Contract No. 2616-01 | Sheet D-23
Feature CHASMARS POND DAM | Designed MP | File No.
Item | Checked | Date 1/23/81 | Date

ii. SPILLWAY DISCHARGE AT TIME OF FAILURE: $Q_S = 467$ CFS (SEE P. D-7)

iii. BREACH OUTFLOW (Q_b):

$$Q_b = 8/27\ W_b \sqrt{g}\ Y_o^{3/2} = 8/27 \times 37 \sqrt{32.2} \times 11^{3/2} \cong 2270 \text{ CFS}$$

iv. PEAK FAILURE OUTFLOW (Q_F) TO FIVEMILE RIVER:

$$Q_F = Q_b - Q_S = 2270 - 467 = 1803 \text{ CFS} \quad \text{USE } 1800 \text{ CFS}$$

c. FLOOD DEPTH IMMEDIATELY DOWNSTREAM FROM DAM:

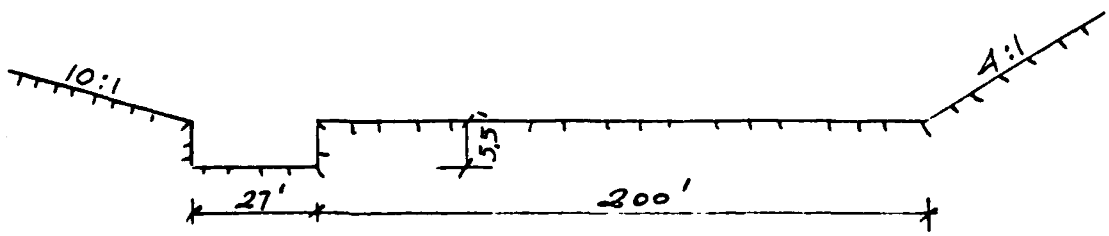
$$Y = 0.44\ Y_o = 0.44 \times 11 = 4.8 \text{ FT}$$

d. ESTIMATE OF DOWNSTREAM FAILURE CONDITIONS AT POTENTIAL IMPACT AREA

(SEE NED-ACE GUIDELINES FOR ESTIMATING D/S FAILURE HYDROGRAPHS)

i. REACH OF FIVEMILE RIVER BETWEEN DAM AND IMPACT AREA:

THE (±) 300-FT-LONG REACH OF FIVEMILE RIVER FROM THE CHASMARS POND DAM TO THE INITIAL IMPACT AREA IS APPROXIMATELY SHAPED AS SHOWN ON THE SKETCH BELOW:



THE AVERAGE SLOPE OF THE REACH IS (±) 0.008

ii. CHASMARS POND DAM RESERVOIR STORAGE AT TIME OF FAILURE.

NO ACTUAL STORAGE DATA OTHER THAN THE ACE-U.S. INVENTORY OF DAMS, DATED 1/24/79, WAS AVAILABLE TO ASCERTAIN THE STORAGE CAPACITY OF THIS DAM. USING THE APPROXIMATE FORMULA: $S = 0.5 A_0 \bar{H} + \bar{A} H$ (A_0 = POND AREA AT SPILLWAY CREST EL. 24.6; ASSUME $A_0 = 26.5$ AC; $\bar{H}$ = AVERAGE DEPTH OF POND BELOW SPILLWAY CREST, ASSUME $\bar{H} = 5$ FT; $\bar{A}$ = AVERAGE POND SURCHARGE AREA, ASSUME $\bar{A} = 20$ AC; $H = 1.5$, SURCHARGE HEIGHT), THE STORAGE IS ± 96 AC-FT.

THEREFORE, ASSUME $S_{MAX} = 96^{*}$ AC-FT ($S_{MAX}/2 = 28$ AC-FT)

* THE ACE-U.S. INVENTORY OF DAMS GIVES: $S_{MAX} = 51$ AC-FT; $S_{NORM} = 32$ AC-FT.

iii PEAK INFLOW TO REACH: $Q_{P_1} = 1800$ CFS

iv. APPROXIMATE STAGE AT POTENTIAL IMPACT AREA FAILURE OF CHASMARS POND DAM.

$Q_{P_1} = 1800$ CFS; $Y_1^{*} = 6.9$ FT; $V_1 = 17.6$ AC-FT $< \frac{S_{max}}{2}$, O.K.

(* ON REACH OF 1700 FT; $n = 0.05$)

PREFAILURE OUTFLOW $Q_S = 467$ $H = 3.3$ $V = 3.6$ ac-ft

$$Q_{P_2} = Q_{P_1}\left(1 - \frac{V}{S_{MAX}}\right) = 1800\left(1 - \frac{17.6 - 3.6}{96}\right) = 1538 \text{ CFS}$$

$H_2 = 6.6$ $V_2 = 15.4$ ac-ft

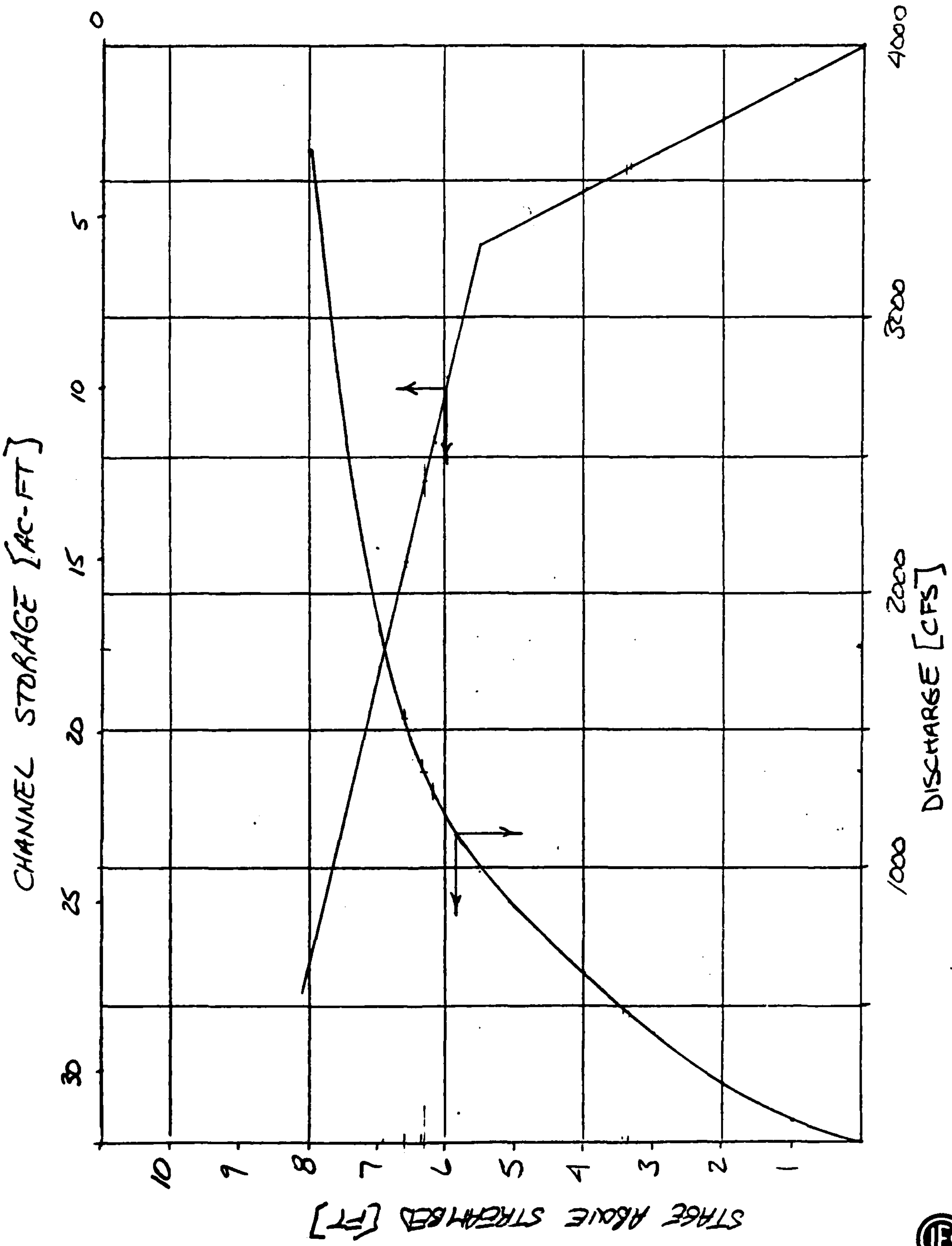
$$\bar{V} = \frac{(17.6 - 3.6) + (15.4 - 3.6)}{2} = 12.9 \text{ ac-ft}$$

$H_3 = 6.4$ $\therefore Q_3 = 1560$ CFS

INTERNATIONAL ENGINEERING COMPANY, INC.

Sheet D-25
Project NDIP
Contract No. 2616
File No.
Feature CHASMARS POND DAM
Designed EHS
Date 3/6/91
Item
Checked
Date

STAGE DISCHARGE - STORAGE CURVE



e. APPROXIMATE STAGE BEFORE FAILURE:

FIVEMILE RIVER FLOW BEFORE DAM FAILURE: $Q_S = 467$ CFS ; $\therefore Y = 3.3$ FT

f. RAISE IN STAGE AT IMPACT AREA: $\Delta Y = Y_3 - Y = 6.4 - 3.3 = 3.1$ FT

III. SELECTION OF TEST FLOOD

1. CLASSIFICATION OF DAM ACCORDING TO NED-ACE GUIDELINES:

a. SIZE: STORAGE (MAX) $\cong$ 56* AC-FT ($50 < S < 1000$ AC-FT)

HEIGHT = 11* FT ($H < 25$ FT)

* SEE p. D-21 AND p. D-23

$\therefore$ SIZE CLASSIFICATION: SMALL

b. HAZARD POTENTIAL: AS A RESULT OF THE DOWNSTREAM FAILURE ANALYSIS AND A VIEW OF THE IMPACT THAT FAILURE OF CHASMARS POND DAM MAY HAVE ON THE POTENTIAL IMPACT AREA DESCRIBED ON p. D-21, THIS DAM IS CLASSIFIED AS HAVING HAZARD POTENTIAL: HIGH

2. TEST FLOOD: 1/2 PMF - 5100 CFS

THIS CLASSIFICATION IS MADE ON THE RESULTS OF THE PREVIOUS ANALYSIS AND CLASSIFICATION.

IV SUMMARY

1. TEST FLOOD : 1/2 PMF = 5100 CFS

2. PERFORMANCE AT PEAK FLOOD CONDITION:

a. PEAK INFLOW: $Q_{P_1}' = 1/2$ PMF = 5100 CFS;

b. PEAK OUTFLOW: $Q_{P_3}' = 5040$ CFS

c. SPILLWAY CAPACITY:

SPILLWAY CAPACITY TO TOP OF DAM EL. 26.1:

$H = 1.5$ FT; $Q_S = 467$ CFS OR 9.3 % OF Q_{P_3}'

AT TEST FLOOD OUTFLOW = 5040 CFS THE SURCHARGE ELEVATION IS 36.6 NGVD.

THEREFORE, AT TEST FLOOD $Q_{P_1}' = 1/2$ PMF THE DAM IS OVERTOPPED TO A DEPTH OF 10.5 FT (VS. EL. 26.1) OR TO A SURCHARGE OF 12. FT.

3. DOWNSTREAM FAILURE CONDITIONS:

a. PEAK FAILURE OUTFLOW : Q = 1800 CFS

b. FLOOD DEPTH IMMEDIATELY DOWNSTREAM FROM DAM: $Y_0 = 4.8$ FT

c. CONDITIONS AT THE INITIAL IMPACT AREA DOWNSTREAM FROM DAM:

i. APPROXIMATE STAGE BEFORE FAILURE: $Y = 3.3$ FT

ii. APPROXIMATE STAGE AFTER FAILURE: $Y_3 = 6.4$ FT

iii. APPROXIMATE RAISE IN STAGE AFTER FAILURE: $\Delta Y = 3.1$ FT

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

FILMED

9-84

DTIC